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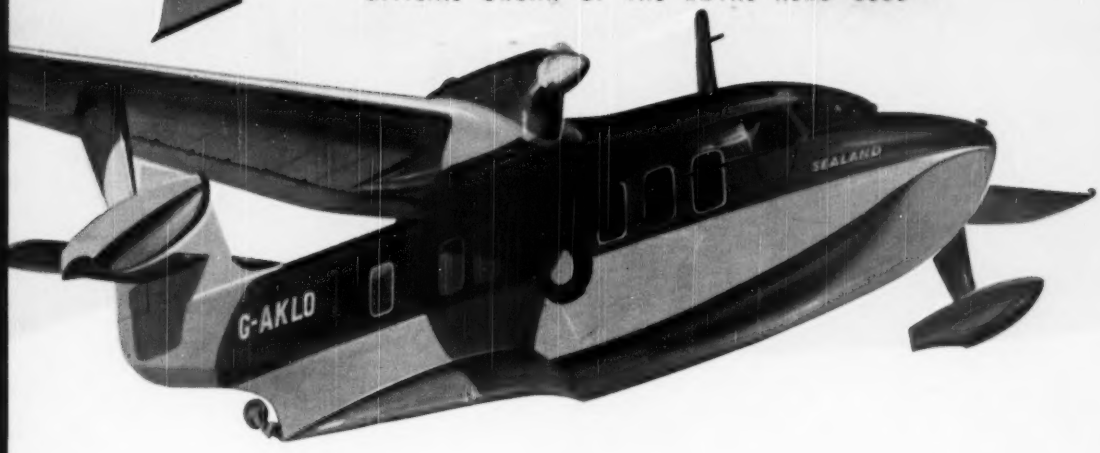

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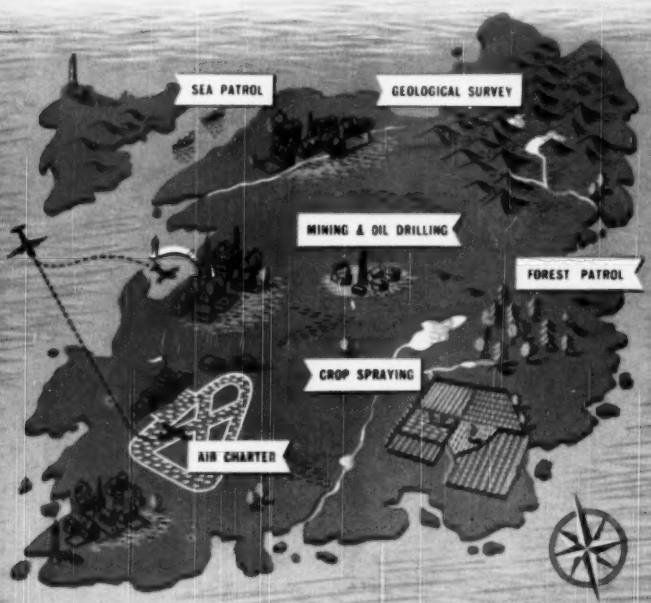

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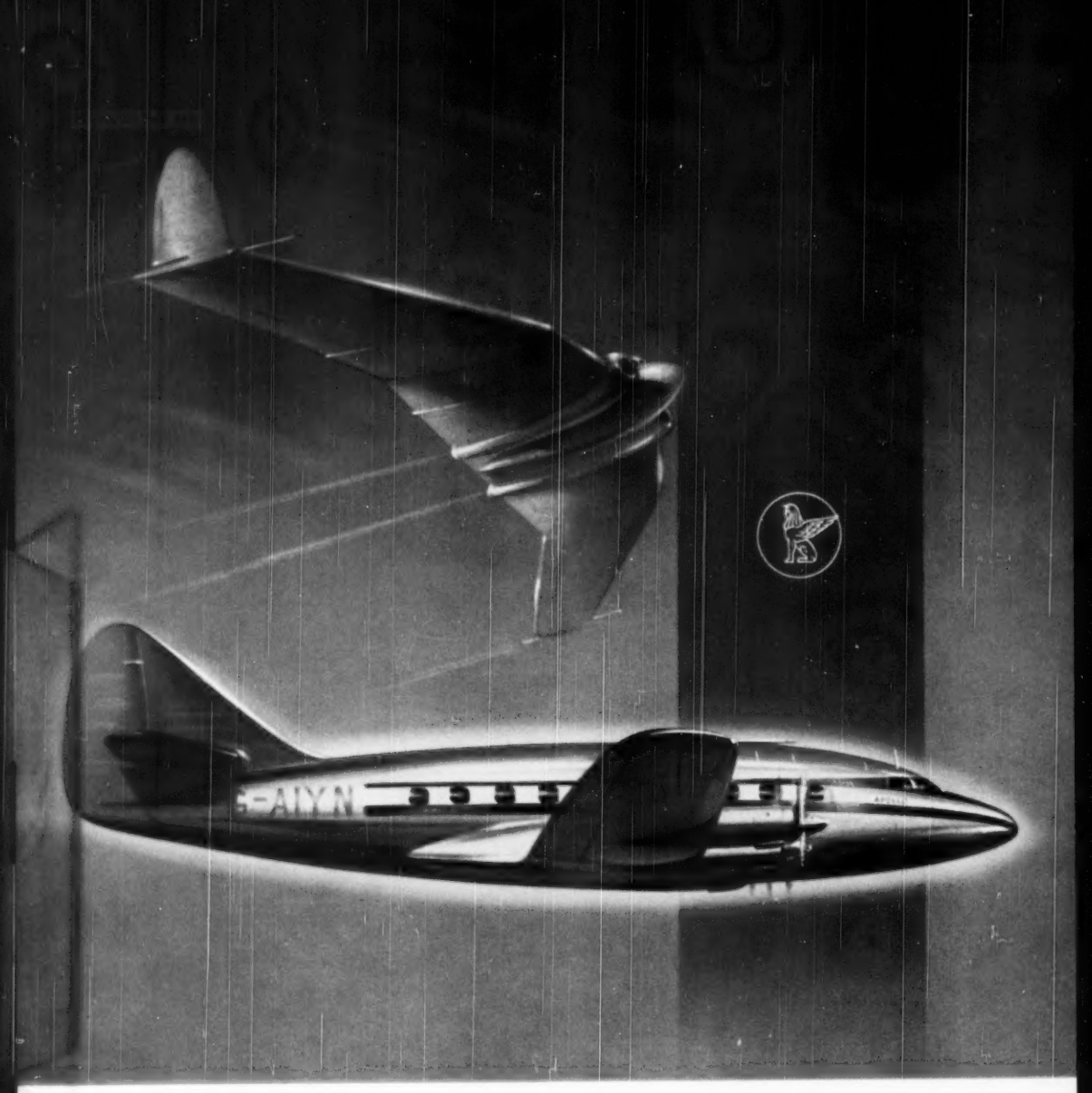

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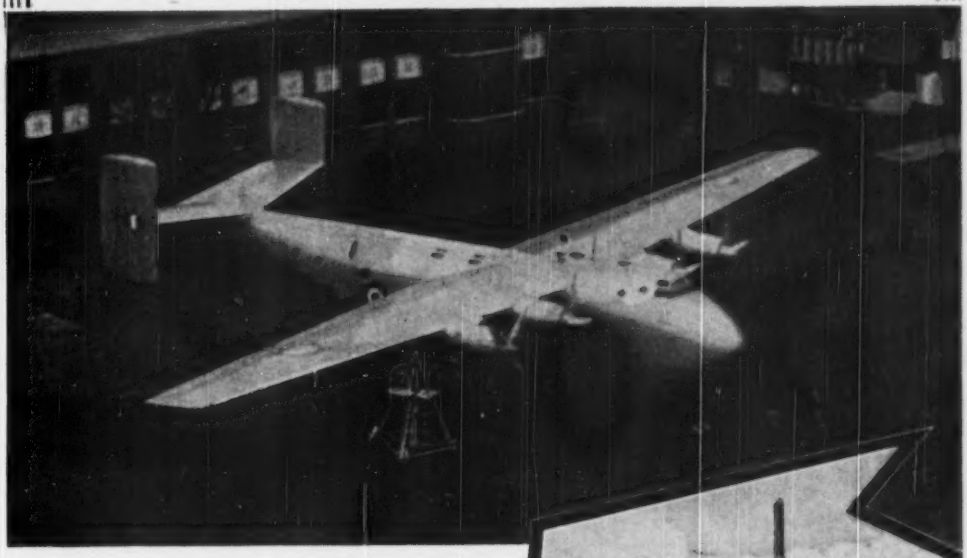

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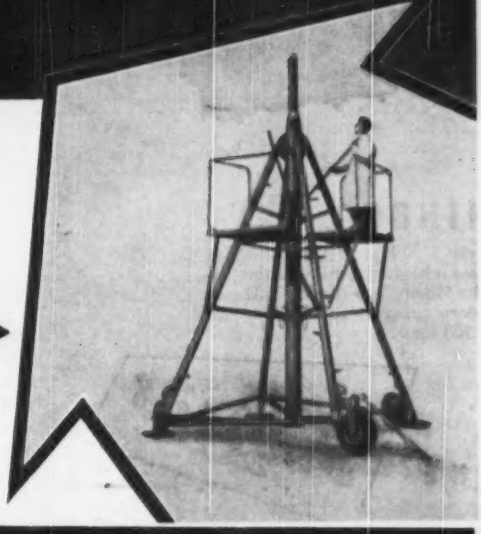

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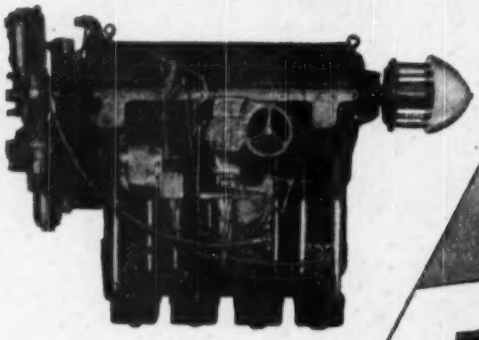

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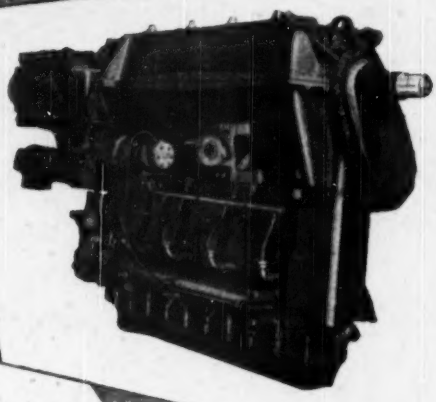

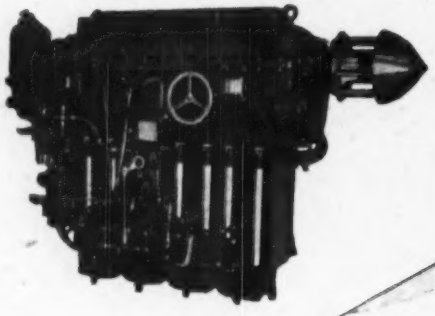

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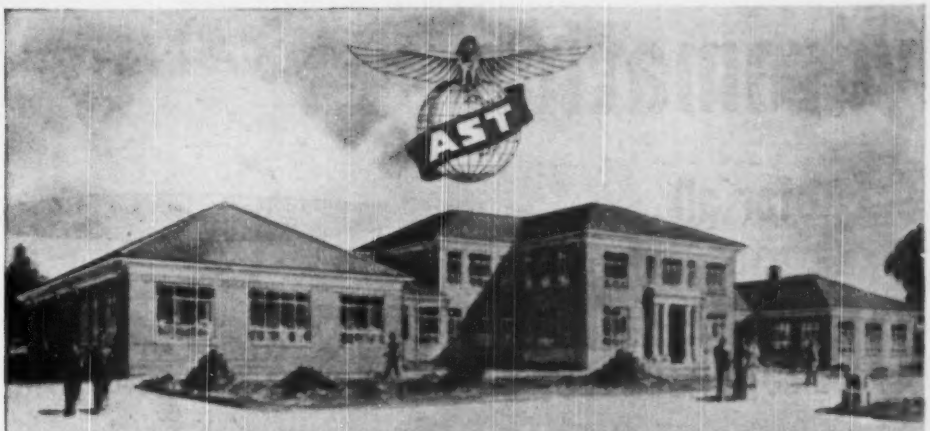

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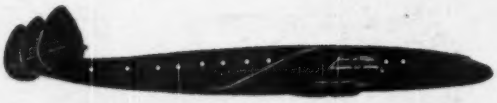

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In this issue:

Yorkshire Air Races - - 114
Unpreparedness of the R.A.F. - - - - - 120
Queen Charlotte Airlines - - - - - - 121
Compound Interest - - 122
Pictures of the Week - 124
Aeronautical History Enshrined - - - - 126
Sidewash and Stability - 128

No Time for Half-measures

NO avowal of peaceful intentions could be nearly so convincing as the apparent reluctance of the British people and government to make any really serious or whole-hearted efforts to prepare for their own defence. For centuries past, by hook, crook and good fortune, this country has managed to remain undefeated in war, and there has been a rather smug tendency to think that by some divine right this will continue to be the case. More recently, when we were forced into war unprepared, time was indeed almost miraculously provided in which to recover and build up strength before a mortal blow could be dealt us.

To-day there is no reason whatever to think that such breathing-space will again be forthcoming; yet not a single Command or branch of the Royal Air Force, our first line of defence, is anything like up to the requisite strength in numbers of men or aircraft, and the strength of the aircraft industry itself has been reduced to well below the danger point by lack of production orders.

The Council of the Air League of the British Empire, through its chairman, Sir Guy Garrod, last week expressed its views on the lack of preparedness of the Air Force (see page 120). Answers to questions on defence in the House of Commons had not been reassuring, said Sir Guy. We agree entirely with him and with the Air League Council. It may be added, moreover, that further questions in the House on Wednesday of last week produced equally unsatisfactory answers from the Secretary of State for Air. When his attention was drawn to the statement made by Air Chief Marshal Sir Guy Garrod, Mr. Henderson said "We are all entitled to our opinions, and that is the opinion of the gentleman who made the statement." Here we may remark that Sir Guy was speaking for all the members of the Air League Council: their names are printed on page 120 so that readers may judge whether the views of men of such experience should be so airily brushed aside.

M.P.s of all parties fired a series of somewhat disconnected questions at Mr. Henderson about Fighter, Coastal and Transport Commands, about manning the fighter-control units, and about the availability of radar equipment. The answers were of the usual non-committal, soothing, but unenlightening kind. It seems that such measures as are being taken to strengthen and improve our air defences are mostly a continuation or slight extension of those which during the last year or two have failed to produce the necessary results. A great deal more energy and enterprise were displayed in 1939 than to-day—the institution of the "shadow factories" and expansion of the R.A.F.V.R. were two examples.

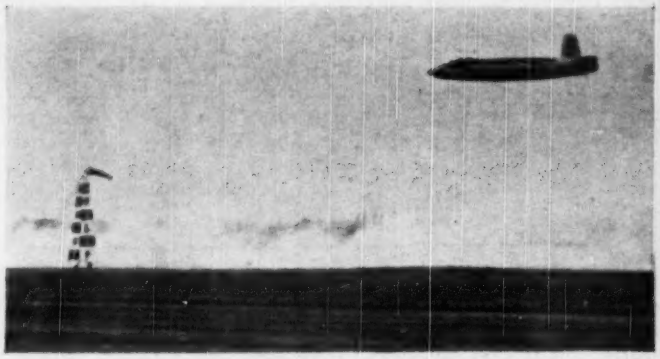
No one doubts that the decisions and actions which the world situation now demands are difficult to take, but inadequate defences are little better than none at all. An emergency of sufficient gravity to cause great consternation among the peoples of America and the British Commonwealth has already arisen in Korea. Malaya, Indo-China and Burma are likewise quickmatch awaiting the spark. The American President and people have seen the red light, but it is to be feared that the British Government are either colour-blind or are unperturbed by the now unmistakable glow. What more is required to bring home the dangers the country is facing? Energetic preparations for defence are not conducive to war—quite the contrary—but military preparedness cannot be effected overnight, or even in a month. The outcome of another war might well be settled in the first few weeks, and involve no more than the men and equipment held in readiness on the day it began. Reluctant as everyone would be to give up our new and expensive social services, if sufficient money for defence cannot be found elsewhere some curtailment may be the only alternative. Is it not better to have a toothless head for a year or two than a fine set of free dentures with no head to carry them?

A clear indication from all the democratic countries that they intend fiercely to resist any aggression, or any attempt to interfere with their freedom, is likely to provide the best means of securing peace; but such a declaration is meaningless unless backed by the ability to resist. Weakness is frequently regarded as an invitation by an unscrupulous aggressor. To-day, time is not among our allies.

THE YORKSHIRE RACES

Two New Records Set Up: Three Well-contested Events

(Illustrated with "Flight" Photographs)



Winner of the S.B.A.C. Cup, Lithgow crosses the line in the Supermarine Attacker. A smoke marker indicates the finish.

IT is many years since a major air-race meeting has been staged in Yorkshire, and in spite of threatening weather and the comparative inaccessibility of the airfield, a large, cheery and enthusiastic crowd—estimated at 30,000—gathered at Sherburn-in-Elmet last Saturday, July 22nd. They were there to see the races for the S.B.A.C. Challenge Cup, the Air League Challenge Cup and the Yorkshire Aeroplane Club's own Trophy. A number of flying events, in addition to the races, helped to complete an afternoon's excellent entertainment—only slightly interrupted by the occasional shower—upon which the Yorkshire club, the oldest in the country, is to be congratulated.

During the morning there was the usual practice and preparation, but there was also an air of suspense: it centred upon a hanger in which frantic efforts were being made to install a new Ghost turbojet in the Venom. Could the aircraft be made ready in time? On all sides one heard discussed the remarkably fine forced landing on Sherburn airfield which John Derry had pulled off on the previous evening. Approaching the finish of a practice lap of the 100-km course at very high speed, his engine cut dead; the aircraft could be seen to falter momentarily and then zoom as Derry gained height either to get out—if that was inevitable—or to make a half-circuit and glide landing. Fortunately the latter course proved possible and by magnificent judgment, in spite of feeling rather shaken, the pilot put the aircraft down unharmed. De Havillands said later that installation details of the G[illegible] in the Venom had not been fully developed, most of the test flying to date having been done at altitude.

Then began the council of war and the all-night task of fetching another engine and installing it. Unfortunately, although the work was completed by mid-afternoon it was eventually thought advisable not to race the Venom after all and rules were waived to allow the substitution of a production Vampire 5, ferried by John Cunningham from Hatfield.

For most people the programme proper started with the departure of a Bristol Sycamore helicopter to collect the Lord Mayor of Leeds, Alderman F. O'Donnell, from Woodhouse Moor, near the city centre. Before he arrived, however, several of the larger racing aircraft made practice flights, including the Attacker, the pilot of which (Michael Lithgow) wished, among other things, to use up some of the fuel in the large long-range belly tank to facilitate its removal.

The Lord Mayor having landed, the first machines in the Yorkshire Club's race, already on the starting line, took off. First away was the Tipsy open side-by-side trainer (K. C. Milligan) with a big start—5½ min—on the Tiger Moth (S/L. W. Evans) from the Newcastle Club. Nine aircraft competed, scratch man being Ron Paine in the Hawk Speed Six.

At the end of the first of three laps of the 17½-mile course, the Tiger was moving up fast on the little Tipsy, which was obviously having a very rough ride, and D. H. Wyatt's Cirrus Minor II Auster V, J/1 (*sic*) was going very well. Paine and Lashbrook (the latter in his light blue Proctor III) looked even faster than usual. As the race progressed the Speed Six seemed to have an increasingly good chance and the Auster and Tiger were having a good tussle. Eventually, to most people's surprise, S/L. Evans' old blue Tiger came in a fairly easy first with Wyatt's cream Auster and Paine's Speed Six racing for second and third places.

The Tipsy retired and Hayhow's Auster and Lashbrook's Proctor were disqualified for cutting corners. The engine of Alington's Sparrowhawk unfortunately had impulse-starter trouble and failed to get away. Cole, another non-starter, had had luck during morning practice, when he damaged his airscrew blade-tips while taxying over the rough field.

The winning Tiger achieved the excellent speed of 107.5 m.p.h. Close examination revealed removal of slots and anti-spin straights and the fairing-off of struts, pitot tubes and such points as the leads-in to the tail surfaces.

YORKSHIRE AEROPLANE CLUB TROPHY

Pos.	Start	Competitor, Aircraft and engine	Handicap m. s.	Speed m.p.h.
1	2	W. Evans (Tiger Moth, Gipsy Maj. I)	05 47	107.5
2	4	D. H. Wyatt (Auster V, Cirrus Minor II)	08 56	110.0
3	Scr.	R. R. Paine (Hawk Speed Six, G. Six II)	18 59	178.5
4	6	J. N. Somers (Gemini, Gipsy Maj. Ic)	16 32	157.5
5	5	J. K. Astin (Proctor IV, Gipsy Queen II)	14 42	143.0

Prizes.—Winner receives Yorkshire Aeroplane Club Trophy. Cash prizes, 1st, £100; 2nd, £50; 3rd, £25.

Spitfires of No. 609 (West Riding) Squadron, R.Aux.A.F. next entertained with formation drill and individual aerobatics, after taking off in pairs. Later four Meteors of No. 257 Squadron, with three in vic and "one in the box," gave a remarkably fine display of formation aerobatics. Polished rolls and loops were made despite the patches of low cloud and mediocre visibility.

If only because of the variety of aircraft types which compete, the Air League Handicap is always most exciting. Both foreign entries, the Italian Fiat G-46 and Norwegian B.H.T. I had unfortunately withdrawn, but except for the substitution of Miss J. Bird for I. A. Forbes as pilot of the Nighthawk, all was according to programme. Somers' Major Gemini was exactly as entered for the King's Cup; Paine's Speed Six was reported to have had its airscrew-blade area slightly further reduced. The non-civil aircraft, all naval types, were, of course, stripped of hooks and so on. The Sea Fury was short of its gills and the Firebrand had a large direct air-intake

The Vickers Supermarine Seagull I, flown by L. R. Colquhoun, was fourth in the Air League Cup Race and secured a record.

All the winners : Left to right : Lithgow, who secured the S.B.A.C. Cup at 533 m.p.h.; S/L. W. I. Lashbrook receiving the Air League Cup from Mr. Frank Beswick, Parliamentary Secretary, Ministry of Civil Aviation; and S/L. W. Evans with the Yorkshire Aeroplane Club Trophy.

scoop on top of the cowling, the standard port wing root entry being faired over. The dive brake hinges were faired off.

A contender—successfully, as it turned out—for the world's amphibian 100-km closed-circuit record was the Supermarine Seagull I (Rolls-Royce Griffon 29), flown by L. R. Colquhoun.

In the first lap of the race S/L. W. I. Lashbrook (Proctor) managed to pass the Nighthawk, which had a minute's start. Somers was having a neck-and-neck duel with Alington's Sparrowhawk, now going very well. The gawky Seagull, with about eight minutes' start on the Firebrand, surprised most people by its fine turn of speed as it raced on alone.

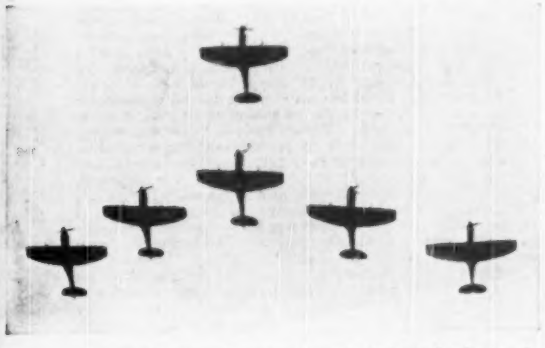
Paine failed to appear on his first lap, and it was ascertained that a burned-out No. 4 exhaust stub had caused him to use Linton-on-Ouse for a precautionary landing while completing the fourth leg of the six-sided course. R.A.F. ground crew had it welded and replaced in a matter of minutes, and Paine was back at Sherburn shortly after the finish.

The finish was marked by a great rush and dive for the line, gained fairly easily by Lashbrook—a popular and well-deserved victory for a regular race competitor. The Sparrowhawk came second, just beating the Sea Fury Trainer (F. Murphy), which had been performing very well indeed. The Seagull droned in as No. 4, a length or two ahead of Somers' Gemini, which had slowed up somewhat after losing a starboard window panel and some fairing strips.

The Sea Fury Trainer established a new British piston-engined record at 378 m.p.h. for the 100-km closed circuit; like that of the Seagull, the record is, of course, subject to confirmation.

Before the final race the French Air Force Patrouille d'Etampes gave its now classic display of formation and individual flying all ways up. The gusty wind tossed the little Stampe biplane trainers about but never caused them to lose station, either inverted or otherwise—a truly remarkable performance which caused many a gasp from the crowd.

And so to the big moment for the S.B.A.C. jet handicap arrived and the scream of turbines running-up caused the



Among the non-racing events, formation flying by Spitfire 16s of No. 609 (West Riding) Squadron, R. Aux. A.F. earned praise.

AIR LEAGUE CUP RACE

Pos.	Start	Competitor, Aircraft and engine	Handicap m. s.		Speed m.p.h.
1	2	W. I. Lashbrook (Proctor III, G. Queen II)	00	58	161.5
2	4	C. G. Alington (Sparrowhawk, G. Maj. Ic)	03	36	170.0
3	8	F. Murphy (Sea Fury Tor., Centaurus 18)	27	36	366.0
4	6	L. R. Colquhoun (Seagull I, Griffon 29)	16	19	235.0
5	3	J. N. Somers (Gemini III, Gipsy Maj. Ic)	03	02	166.0
6	1	Miss J. Bird (Nighthawk, Gipsy Six II)	00	00	155.0
7	7	P. G. Lawrence (Firebrand, Centaurus 57)	24	46	301.0

Records (subject to confirmation).—L. R. Colquhoun (Seagull I) gains world's 100-km closed-circuit record for amphibian aircraft at 241.9 m.p.h.; previous holder, Maj. A. P. de Seversky (Seversky amphibian), 237.079 km/hr (209.46 m.p.h.). F. Murphy (Sea Fury Trainer) establishes British 100-km closed-circuit record for piston-engined aircraft, 378.8 m.p.h.

Prizes.—Winner holds Air League Challenge Cup for ten months. Cash prizes, 1st, £100; 2nd, £50; 3rd, £25. Fastest lap, £50 (Murphy, 378.8 m.p.h.); fastest by aircraft under 1,750 kg, £25 (Alington, 171.8 m.p.h.).

disappointment over the withdrawal of the Venom to be forgotten. Apparently the very high speed of the Venom in practice was no surprise to the handicappers, who had placed it at scratch with the Sea Hawk, for which the handicap speed was over 600 m.p.h. No external tanks were fitted and all the machines were smooth and polished.

There was only 2 min 11 sec between the four production aircraft and it was certain that all would be expertly handled. Derry was away first in the Vampire 5 and Lithgow followed, in the Attacker—newly back from its tour abroad—as the Vampire, having rounded the scatter-point, disappeared to the south-east.

Zurakowski coaxed the Meteor 7 into the air before the first runway intersection and accelerated away very fast. Wade was on his tail in the Sea Hawk as he straightened away from the scatter-point turn.

On the first lap there was no change of order, but the Attacker was obviously pulling up well and justifying its pre-take off position as favourite with those "in the know."

In a very short time, as it seemed, the Attacker was seen streaking for the line with the Vampire quite close behind and the Meteor 7 and Sea Hawk progressively close behind again. Thus they screamed past the post, with occasional shivers of vapour appearing over their cockpits and leading edges.

With a few minutes' Auster crop-dusting, and the distribution of the prizes by Mr. Frank Beswick (deputizing for Lord Pakenham, who was ill), a very successful day thus came to a close except for joy riding—in the rain, which now set in.

S.B.A.C. CHALLENGE CUP RACE

Pos.	Start	Competitor, Aircraft and engine	Handicap m. s.		Speed m.p.h.
1	2	M. J. Lithgow (Vickers Supermarine Attacker 1, R.-R. Nene)	1	34	533.0
2	scr.	J. D. Derry (D.H. Vampire 5, D.H. Goblin 2)	0	00	472.0
3	3	J. Zurakowski (Gloster Meteor 7, R.-R. Derwent 5)	2	05	536.0
4	4	T. S. Wade (Hawker Sea Hawk, R.-R. Nene)	2	11	536.5

Prizes.—Winner holds S.B.A.C. Challenge Cup for ten months. Cash prizes, 1st, £100; 2nd, £50; 3rd £25. Fastest lap £50 (Wade, 584 m.p.h.).

TEST PILOTS CONFER

A Valuable Airing of Views at Boscombe Down

THOUGH a number of test pilots' conventions have been held in the United States, none on a large scale had taken place in this country until, on July 12th, a conference of some 50 pilots, representing almost all the principal aircraft and engine constructors, was held at the Aeroplane and Armament Experimental Establishment, Boscombe Down. In addition, the convention was attended by over 60 representatives of A. and A.E.E., R.A.E., E.T.P.S., and other official establishments.

The idea of holding the convention was conceived by S/L. R. A. Watts of "A" Sqn., Boscombe Down, and S/L. R. G. Woodman, D.S.O., D.F.C., Deputy Superintendent of Flying, was responsible for the organization.

All the discussions were of a technical nature, and details of the views expressed are, understandably, not suitable for public disclosure. During the morning session, techniques for high-speed and high-altitude test-flying were debated, the discussion—under the chairmanship of G/C. H. P. Broad, C.B.E., D.F.C. (Superintendent of Flying, Boscombe Down)—being based on papers read by S/L. John Derry, D.F.C. (de Havillands) and S/L. Watts, and upon a reply by S/L. Smythe (R.A.E.).

Capt. Summers (Vickers-Armstrongs), Lt. Cdr. Richmond (A. and A.E.E.), P. G. Lawrence (Blackburn and General Aircraft) and Cdr. (E.) Wilson of the E.T.P.S., in earnest consultation.

A. Cdre. A. W. B. McDonald, O.C. of Boscombe Down, with (left) W/C. Ruffell-Smith of the Institute of Aviation Medicine.

For the afternoon session the chairman was Mr. P. G. Lucas, G.M., F.R.Ae.S., de Havilland's technical sales manager and formerly Hawker's chief test pilot. Lt. R. H. Reynolds, D.S.C. (Boscombe Down) introduced a discussion on the low-speed handling of high-performance aircraft, and there followed a paper by W/C. Ruffell-Smith, A.F.C., Institute of Aviation Medicine, on safety equipment for test pilots; this produced a particularly illuminating discussion, nearly a score of pilots giving their views. The final subject for debate—introduced by G/C. A. H. Wheeler of the R.A.E.—concerned the provision of test pilots for the Industry and the experimental establishments.

At the subsequent dinner in the officers' mess the guests were entertained by the A. and A.E.E.; welcoming them, A. Cdre. A. W. B. McDonald, C.B., A.F.C., the O.C.D., remarked on the great success of this first convention, and Mr. A. J. Pegg, M.B.E., Bristol's chief test pilot, expressed thanks in reply.

TURBOJET LUBRICATION

N.A.C.A. Tests on Supplementals and Additives

SOME noteworthy research into the effectiveness of supplemental lubricants and additives, with particular reference to the lubrication problems associated with gas turbines, is described* by Messrs. Edmond E. Bisson and Robert L. Johnson, of the N.A.C.A.

Lubrication of high output aircraft engines is always complicated by three important variables, viz., high speeds, high loads and high temperatures, but the gas turbine increases this complication because its operating temperature range might embrace values as low as −55 deg C and as high as 205 deg C.

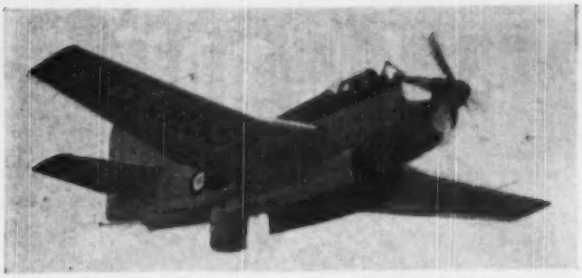
Disparity in viscosity requirements means that, to satisfy so wide a temperature range with one lubricant, some sort of compromise is inevitable; and such a compromise is afforded by the use of supplemental lubricants designed to give adequate lubrication when the normal lubricant breaks down, and the use of additives of the extreme pressure type. By the use of an apparatus designed to give a pure sliding action, investigations were made on a variety of supplemental lubricants and additives, the test runs being made at loads from 269 to 1,017 g (giving an initial Hertz surface stress of 126,000 to 194,000 lb/sq in and over a range of sliding velocities of 50 to 7,000 ft/min).

Of the supplemental lubricants, molybdenum disulphide (MoS_2) and graphite (C) were thought to have the most promise; the major difference between the two is that molybdenum disulphide has a higher chemical reactivity, which gives it a higher tenacity for steel. Whereas both materials have low friction-coefficients at low sliding velocities, the N.A.C.A. tests showed that, as sliding velocity increased, the graphite showed an increase in friction, whereas the molybdenum disulphide showed a decrease. An increase in surface temperature coincident upon the higher sliding velocity would tend to extreme the films of moisture and gases which have been considered by some investigators to be the lubricating agents of graphite. Molybdenum disulphide, however, does not depend for its lubricating action on absorbed films, and consequently does not show such a trend.

Investigations were also made on the effects of certain oxides on the friction and wear of sliding surfaces. The tests were made with discs on which were formed solid films of iron oxides (Fe_2O_3 and Fe_3O_4) 1,200 Angstrom units thick, i.e., 5×10^{-4} inches. The results showed that, whereas Fe_2O_3 maintained a relatively high coefficient of kinetic friction throughout the range of sliding velocities, Fe_3O_4 dropped from 0.48μ at 50 ft/min sliding velocity down to 0.1μ at 5,000 ft/min, which latter value it maintained up to the maximum test speed of 7,000 ft/min; the load was 269 g. Surface analysis by electron defraction has shown that Fe_2O_3 is the predominant film material on lubricated engine parts that have been effectively run-in, and that Fe_3O_4 is predominant on failed surfaces. It is suggested, therefore, that Fe_2O_3 could serve as a supplemental lubricant.

The additives tested were confined to varying percentages of sulphur in pure cetane. Friction was reduced virtually progressively with increase of additive proportion up to the maximum tested value of 1.5 per cent. sulphur content. However, all proportions had in common an increase of friction as sliding velocity was increased above 1,000 ft/min. These results were interpreted as possible evidence of a critical sliding velocity above which the additive did not adequately perform its function as an anti-weld agent because there was insufficient time for the additive to react chemically with the surface to form an effective low-shear-strength film.

*In a paper abstracted in the March, 1950, issue of the "S.A.E. Journal."



FAIREY 17 DEMONSTRATED

A Well-equipped Submarine-hunter

(Left) With its bomb-doors open and radome extended, the Fairey 17 presents an aggressive appearance. Its Z-form wing-folding system (below) is neat and compact. The flaps are divided.

MR. GORDON SLADE, chief test pilot of the Fairey Aviation Company, demonstrated his company's new anti-submarine aircraft at White Waltham last Thursday. He showed beyond doubt that the Fairey 17 has handling qualities well suited to deck-operation. The short take-off run, in almost still air, was especially impressive; and with one of its contra-rotating aircrews stopped (and half the Double Mamba twin turboprop power-unit out of action) the aircraft buzzed healthily overhead before making a docile approach and landing on half-power.

Starting and re-starting of the Double Mamba was accomplished quickly and positively, and the operations of wing-folding, bomb-bay opening and radome-extension seemed equally effective. Further details of the Fairey 17 will, it is hoped, be published in the next issue.

"Flight" photographs

MR. H. R. GILLMAN FOR F.A.I.

IT is learned that Mr. Harold R. Gillman O.B.E., A.F.R.Ae.S., has asked to be released from his posts as secretary of the Aerodrome Owners' Association and the British Air Charter Association in order to become director-general of the Fédération Aéronautique Internationale at its headquarters in Paris. The new appointment will be effective from September 1st.

Although Mr. Gillman has been a key man in the organization of the two associations since their inception and his loss will be felt most keenly, their work will continue as before.

It will be recalled that Mr. Gillman was secretary of the S.B.A.C. from 1929 to 1945 and of the Aerodrome Owners' Association from the time it was created in March, 1934. After leaving the S.B.A.C. in 1945 he played a leading part in the formation of B.A.C.A.

U.S. LICENCE FOR LIQUID SPRINGS

DOWTY EQUIPMENT, LTD., announce that the Cleveland Pneumatic Co., of Cleveland, Ohio—the largest manufacturers of undercarriages in the U.S.—has acquired the licence and manufacturing rights of the Dowty liquid spring shock absorber. Using pre-stressed cylinders and silicone fluids, a liquid spring shock strut, designed and manufactured at Cheltenham, has recently been supplied to the U.S. Experimental Station at Wright Field for use in the undercarriage of a B-36 bomber. In addition to the large number of home aircraft which are fitted with liquid springs, both the Avro Canada C-102 Jetliner and the CF-100 fighter use this system of suspension.

CIVIL AIRCREW TRAINING

IT is announced by the College of Aeronautical and Automobile Engineering, Chelsea, that a new course of evening and day classes in aircrew technical training is now available. Stated to be the only course in Great Britain covering all types of civil aircraft, it is intended to meet the requirements of candidates who wish to sit for the M.C.A. written examination conducted by the A.R.B. for pilots' "B" licences and flight engineers' licences. Both the initial issue of a licence and a type endorsement for all civil aircraft on the British register, including helicopters and flying boats, are within the scope of the course.

Technical training is under the direction of Mr. W. J. C. Speller, A.F.R.Ae.S., who, from 1914 until 1942, was a well-known member of the Aeronautical Inspection Directorate. From 1942 to 1946 he was works superintendent at Aero Engines, Ltd., of Bristol, thence joining the Licensing Section of the Air Registration Board. Mr. Speller, who is 59, is a pilot and a member of the Hampshire Aero Club.

BLACKBURN BOARD "DIFFERENCES"

"SERIOUS differences of opinion" are the reasons given by the board of directors of Blackburn and General Aircraft, Ltd., for terminating the appointments, as from July 26th, of Capt. N. W. G. Blackburn and Mr. H. V. Gort as joint managing directors of the company. It is further stated that the chairman, Mr. Robert Blackburn, will, in consultation with his colleagues, take early steps to provide for the company's future executive management.

A shareholders' meeting is being convened and a statement by Mr. Gort and Capt. Norman Blackburn, who continue as ordinary directors, is expected. The action of the board is described by Mr. Gort as "irresponsible."

FORTHCOMING EVENTS

July 27-Aug.	5.	Holy Year Rally, Italy.
July	28-31	Orange Rally, France.
July	29.	Newcastle-upon-Tyne Aero Club: Norton Griffiths Trophy Race and Grosvenor Cup Race (both International), Woodlington.
July	29.	Royal Netherlands Aero Club: International "Squadrone" Competition, Ypenburg.
Aug.	5.	Liverpool Flying Club: "At Home."
Aug.	6.	Cowes Aero Club: Display.
Aug.	7.	Display, Eaton Bray Airfield, Beds.
Aug.	7.	South Coast Flying Club: Dance.
Aug.	16.	R.A.F. Golfing Society: Match v. R.M. and R.M. G.S., West Hill.
Aug.	19.	Association of British Aero Clubs: Summer Convention.
Aug.	19.	Swansea and District Flying Club: Kemsley Trophy Race (International), Fairwood Common, Swansea.
Aug.	20.	Skegness Air Rally, Ingoldmells.
Aug.	26.	Wiltshire Flying Club: Thruxton Races.
Sept.	2.	International Contest for Free Balloons, Holland.
Sept.	2.	Coventry Aero Club: Siddeley Challenge Trophy Race, Baginton, Coventry.
Sept.	5-10.	S.B.A.C. Flying Display and Exhibition.
Sept.	15.	Battle of Britain Day.
Sept.	16.	R.A.F.: "At Home" Day.
Sept.	16.	Daily Express International Air Race, Hurn Airport, Bournemouth.

HERE and THERE

Australian Carrier Here

THE Royal Australian Navy's light fleet carrier *Sydney* arrived at Portsmouth on Monday. Before returning to Australia later this year the *Sydney* will embark a new carrier air group.

Bomber into Tankers

BOEING AIRCRAFT have received a U.S.A.F. contract for manufacture, and installation, of the new "flying boom" flight-refuelling equipment for 116 B-29 Superfortresses. Although large, the order is regarded as a service-test quantity. American bomber groups equipped for aerial refuelling continue to employ the flexible-hose system designed by the British company of Flight Refuelling, Ltd.

The R.A.F. and Korea

BRITISH Naval Forces taking part in the Korean operations under General MacArthur have been strengthened by a squadron of R.A.F. Sunderlands. This was announced by the Air Minister on Saturday.

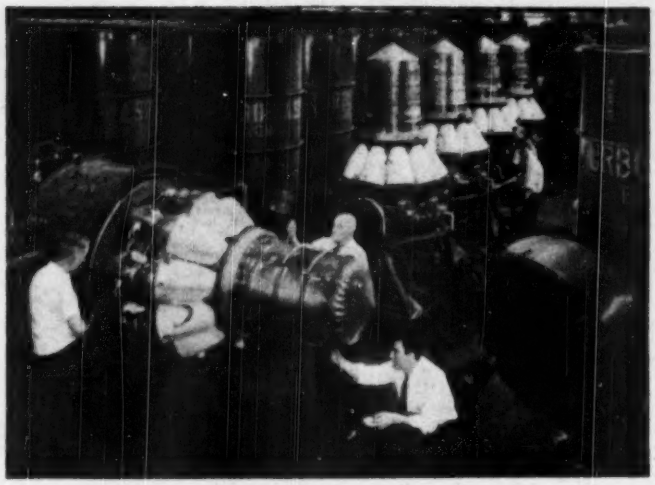
Earlier, agency messages from Tokyo had reported the arrival of three of the flying boats at Iwakuni, Japan.

Latest Freighter

SPECIFICATIONS of the latest Bristol 170 twin-engined freighter or passenger transport—the Mk. 31—include a 2,000lb increase in the maximum all-up weight and an improved power-loading.

This has been made possible by the installation of two Hercules 739 engines, each of 2,040 h.p., in place of the Hercules 672s (1,700 h.p.) of earlier marks. The Mk. 31 is identified by a newly incorporated dorsal fin.

LADY WITH DESIGNS: Miss Maureen Elliott, a 17-year-old drawing-office trainee with the Bristol Aeroplane Company, has won the scholarship in aeronautical engineering, awarded by the Women's Engineering Society.



FOTTED POWER: These Turbo-Wasp J-42 units, produced at Hartford, Connecticut, by the Pratt and Whitney Division of the United Aircraft Corporation, are being packed in air-tight metal drums to prevent damage or corrosion while in transit or storage. The J-42 is the P. and W. version of the Rolls-Royce Nene; the American company also produces the more powerful J-48, a counterpart to the Tay (6,250lb thrust)

Home Command

SPEAKING at Wolverhampton on Saturday, Mr. Henderson, Secretary of State for Air, announced that, in future, Reserve Command will be known as Home Command. The old title was no longer appropriate as the functions of the Command had recently undergone considerable change; Reserve Command had, for instance, assumed control of a number of active units, including recruiting centres and the Records Office. There was also a proposal that the new Command should work with the Army in planning the defence of R.A.F. stations in this country.

Vampire's 900-mile Lisbon Flight

MORE news is now available of the recent fast flight to Lisbon by John Derry in a D.H. Vampire. The aircraft, which carried standard 100-gall. external wing-tanks, covered the 902.75 miles between Hurn, Bournemouth, and Portella, Lisbon, in 2 hr 14 min, giving an average speed of 404.82 m.p.h. (not 380 m.p.h. as earlier announced).

The longer return trip, from Portella to Hatfield, took exactly the same time, but as the distance involved was 994.75 miles, the speed averaged 446.07 m.p.h. The flights were not officially observed and will not be claimed as records.

Newcastle Next Saturday

TWO more events in the National Air Races series will be flown next Saturday, July 29th, at Woolsington, near Newcastle-upon-Tyne, under the ægis of the Newcastle Aero Club. The Grosvenor Challenge Cup, with an entry of 24, including one from Spain, will be flown over two laps of a 20-mile course; it is confined to aircraft of under 1,000 kg all-up weight. The Norton Griffiths Trophy Race (eight entries, including an Italian pilot), open to aircraft of 1,000-1,750 kg, will be contested over five laps.

After the meeting has been opened at 2 p.m. by Air Chief Marshal Sir James Robb, Service and civil display items will alternate with the races, times of which are: Grosvenor Cup heats, 2.15 and 2.45; Norton Griffiths Trophy, 3.45; Grosvenor Cup final, 4.45. Admission is 2s. (children 1s, cars 2s); special car park, £1, including car's occupants.

Russian Records

THE Soviet Union has captured nine of eleven records, in the model category, homologated by the F.A.I. The remaining two records in the new list are held by France. Two of the Russian records were in the category for jet-powered models; the speeds reached in this instance were 80 m.p.h. and 89 m.p.h.

Lord Hives

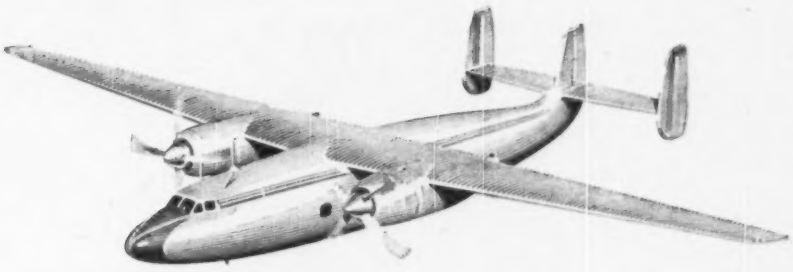
IT seems that recent newspaper announcements concerning the title of the managing director of Rolls-Royce, Ltd., upon whom a barony was conferred in the Birthday Honours, may cause misunderstanding. In actual fact, he has not assumed the title of Lord Hives of Duffield, but simply "Lord Hives."

The Ostrich Attitude

DESPITE the present international situation and the consequent need for a strong and well-trained R.A.F., the Air Ministry continues to receive complaints about the noise of aircraft. The Town Council of Bridlington recently told the Ministry that "visitors and residents had been disturbed by aircraft flying over the town."

The Air Ministry (who might have observed that an enemy atom bomb would cause considerably more "disturbance") obligingly replied that, in future, aircraft would fly over Bridlington only occasionally, and at high altitude. It was stated, however, that

The Ambassador's wide range of economical cruising speeds will show very real advantages in regular service. A scheduled journey-time can in fact be maintained against a 30-m.p.h. headwind on all stage lengths below 900 miles



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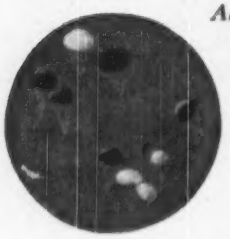
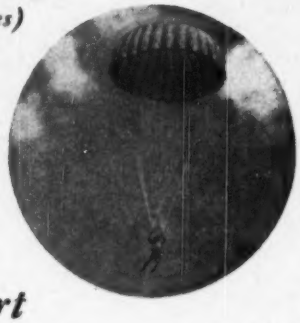
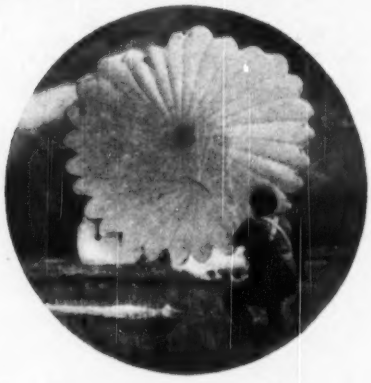


men (and supplies)



needing some visible

means of support



are suited down to the ground with

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ARGENTINA	CANADA	GREAT BRITAIN	NETHERLANDS	PORTUGAL
AUSTRALIA	DENMARK	HOLLAND	EAST INDIES	SPAIN
BELGIUM	ECUADOR	INDIA	NORWAY	SWEDEN
BRAZIL	EGYPT	IRAQ	PERU	U.S.A.
	FRANCE	MEXICO	POLAND	

HERE AND THERE . . .

night-flying was absolutely essential if a well-trained air force was to be maintained.

University Appointment

THE University of London has established a readership in the theory of aeronautical structures, the post being attached to the Aeronautics Department at the Imperial College of Science and Technology. Mr. J. H. Argyris (formerly lecturer in the department) has been appointed to the readership.

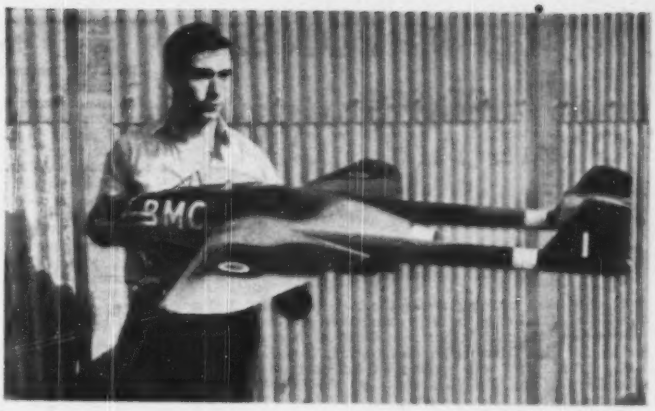
Situation Vacant

IN the July issue of its *Notices*, the Royal Aeronautical Society invites applications for the post of secretary, which will become vacant on the retirement of Capt. J. Laurence Pritchard. A salary in the £1,250-£1,500 range is quoted, depending on qualifications. Applications must be received by July 31st.

A "Must" for Modellers

MODEL aircraft with a 5,000 ft/min rate of climb (faster than a Vampire) will be among the exhibits at the *Model Engineer* Exhibition, which is to be held at the Horticultural Hall, between August 9th-19th. These diesel-powered, vertically climing models have been developed by the Low Speed Aerodynamics Research Association, whose major exhibit will be a multi-channel radio contact set designed for met. research, A.A. training and scale-model free-flight research by the aircraft industry.

Modellers will learn much from the L.S.A.R.A. stand, where technical reports will be available, with experts in attendance. The Association has designed special aerofoils for models, and will demonstrate their efficiency with the aid of a simple low-turbulence wind tunnel.



"*Flight*" photograph.

REALISM: This beautifully finished scale model of a Vampire was a centre of attraction during the Northern Heights Gala held recently at Langley (see *Flight* for July 6th). Powered by a pulse-jet, it flew round its control-line circuit at over 100 m.p.h.

NEWS IN BRIEF

FIRST of its kind, the British Plastics Exhibition and Convention is to be held at Olympia from June 6th to 16th, 1951, during the Festival of Britain. It is to be organized by *British Plastics*, an Iliffe group journal.

* * *

On July 15th many prominent industrialists and political figures visited Akron, Ohio, to attend a celebration in honour of Mr. Paul Weeks Litchfield, chief executive of the Goodyear Company; known as "the grand old man of the rubber industry," he has completed 50 years' service with the company.

* * *

Mr. Peter H. Redpath, lately executive vice-president of Scandinavian Airlines System, is joining Canadair, Ltd., Montreal, as vice-president (sales). Also going to Canadair, as sales engineer, is Mr. K. H. Larsson, who has been S.A.S. technical representative in the United States.

* * *

Blackburn and General Aircraft, Ltd., Brough, E. Yorks, have published a well-illustrated 28-page brochure dealing with all aspects of their apprenticeship scheme.

* * *

The July edition of *Transport Goods Guide* (published twice yearly at 2s 6d by Associated Iliffe Press) provides exhaustive information on all forms of goods transport throughout England, Scotland and Wales.

* * *

Covering instruments calibrated for nominal air speeds of 140 to 280 knots, a British Standard (No. B.S.G. 125: 1950) for turn-and-slip indicators has been published. Copies (price 2s) are obtainable from the B.S.I. at 24, Victoria Street, London, S.W.1.

* * *

The Medigraph perspective drawing instrument, claimed to be "the only machine giving true perspective automatically," is the subject of a leaflet from the makers, the Mollart Engineering Co., Ltd., Surbiton, Surrey. A detailed description of the instrument appeared in our associated journal *Aircraft Production* for May, 1949.

* * *

The Anglo-American Oil Co., Ltd., announces that, as from July 1st, Mr. R. J. Pinder, assistant general sales manager, has been appointed deputy general sales manager. Mr. G. W. Powell, who has been divisional manager of the South Western Division comes to London as assistant general sales manager.

* * *

Leaflets from Kingsbourne Products, Ltd., 3, Eagle Street, Holborn, London, W.C.1, describe three useful works accessories: A right-angle drilling attachment for existing portable drills; another attachment which converts the rotary motion of a drill to a reciprocating motion for hacksawing or filing; and an oscillatory attachment for engine valve grinding.

V.I.P.s' V.SIT to Hatfield on July 13th, when the de Havilland Enterprise entertained the noted American guests seen here: Mr. J. S. McDonnell (McDonnell Aircraft); Mr. J. L. Alwood (North American); Mr. R. S. Boutelle (Fairchild Aviation); Mr. H. M. Horner (United Aircraft); Mr. A. E. Raymond (Douglas Aircraft); Rear Admiral D. C. Ramsey (Aircraft Industries Association of America); Brig. Gen. Alfred H. Johnson (U.S.A.F.); Col. F. B. Wood, (U.S.A.F.). Their hosts included several senior members of the Enterprise, among whom may be recognized Mr. F. E. N. St. Barbe, Mr. R. E. Bishop, Maj. Frank Halford, Mr. A. F. Burke, and Mr. J. L. P. Brodie.

UNPREPAREDNESS of the ROYAL AIR FORCE

Air Defences "Seriously Deficient": Air Chief Marshal Sir Guy Garrod's Warning

AN outspoken warning about the unpreparedness of the Royal Air Force, in both manpower and equipment, to meet the crisis which now threatens, was given last week by Air Chief Marshal Sir Guy Garrod, G.B.E., K.C.B., D.S.C., A.F.C. He was speaking at a luncheon given at Londonderry House, on July 18th, by the Council of the Air League, of which he is chairman.

Four months ago [he said] the Council of the Air League of the British Empire issued a manifesto expressing grave anxiety about the state of our air defences. It was suggested in some quarters that we were alarmist, and even that we were irresponsible. But what was troubling us was the thought that, with the international situation as it was, there might at any time arise some incident, some crisis, that would find this country with insufficient air defences. What we feared is exactly what has happened. In a grave and deteriorating international situation, our air defences are seriously deficient. Three months ago, with a full sense of responsibility, we described the state of our defences as alarming. To-day even that adjective is inadequate.

The broad issue is that our air defences—the Royal Air Force, and almost as important, its Auxiliaries—must be strengthened, at any cost and without delay. If to do this requires more money, that must be found, even if it be at the sacrifice of things that we would all like to have.

We shall have to consider a number of questions, of which by far the most important is manpower. Everything, in any air force, depends upon the existence of an adequate number of highly trained technical personnel. It does not matter how many aircraft you may supply, it is the number you can put up, and keep flying, that matters, and this depends entirely on the number of men available to fly and maintain them. In the R.A.F. at present there are serious deficiencies in some of the most important and highly skilled trades. Those are not my words—they are taken from the memorandum accompanying the Air Estimates for 1950-51. Recruiting, although improved, is admittedly unsatisfactory.

Making Service Attractive

We are convinced, from long experience, that there is only one way in which the manpower problem of the R.A.F. can be overcome, and that is by recruiting long-service volunteers. But that cannot be achieved unless the Service is made sufficiently attractive both as regards pay and amenities. The pay at present is not good enough. How can you expect a skilled fitter to serve in the R.A.F. for considerably less emoluments than he is able to earn in civil life? I know it is argued that there are various additional perquisites, but these do not tip the balance. To raise pay sufficiently to attract men would cost money, but the money must be found. It would not cost as much as many suppose, because if the R.A.F. consisted mainly of long-service Regulars, great economies could be achieved in training establishments at present maintained for National Service men. And, incidentally, many highly trained officers, warrant officers and N.C.O.s could be freed from instructional work for squadron duties.

Then there is the case of officers, and particularly junior officers. Their net emoluments are practically the same as they were 20 years ago, in spite of the great increase in the cost of living. Officers with families are unable to educate their children properly, because, owing to their own frequent movements, they are obliged to send their children to boarding schools, and they cannot afford the fees. The wives of young officers overseas and of non-commissioned officers often have to go out to work to supplement their pay. The Royal Air Force is losing valuable officers who cannot afford to remain in the Service. There are some extraordinary anomalies in this matter. Why, for example, are officers in the National Fire Service compensated for the income tax they pay on allowances, while officers in the fighting services are not?

Another source of great hardship for the Royal Air Force is the shortage of married quarters. There is a considerable housing programme under way, but it is moving too slowly. The Royal Australian Air Force is tackling a similar acute shortage by erecting prefabricated buildings; an equally enterprising policy is needed here.

This matter of manning the Royal Air Force lies at the root of all other deficiencies. Many expedients have been devised, but the deficiencies remain, and something else is needed, and that must include not only long-term expedients, but, now that the crisis is upon us, other special measures which will produce speedy results. For example, there is a large reserve of skilled manpower in the charter companies and firms which undertake maintenance and other work on aircraft, and there is good reason to believe that many of them could be employed in peacetime in the maintenance of Service aircraft, especially those of the Auxiliary Squadrons, and could be available for service with the R.A.F. in an emergency.

We are very glad to see the announcement of the Secretary of State which promises a future of greater security for members of aircrews. It is very welcome, and details will be awaited with great interest. But it does not cover ground staffs and, also, does not deal with the points I have just mentioned, such as emoluments and privileges.

The next matter I wish to discuss is the grave menace of the submarine. Whether or not the atom bomb will be used in a future war may perhaps be a matter for argument, but that the submarine will be a major threat leaves no room for doubt. The aircraft is deadly to the submarine. In the last war, shore-based aircraft destroyed as many submarines as did ships. When the war ended, Coastal Command had 70 squadrons, comprising 1,000 aircraft. It is common knowledge that to-day Coastal Command, as Lord Douglas has said, is but a shadow of that once powerful force, and many of its aircraft are antiquated.

Next there is the matter of fighter defences. This does not mean only fighter squadrons, but the ground services, including radar, without which they cannot operate. Our fighter squadrons are being strengthened on a plan which will not be complete till the end of next year. At the same time we are supplying the latest types of fighter aircraft in considerable numbers for our Western Allies. Why is this? In the House of Commons on July 5th the Parliamentary Under Secretary to the Air Ministry said, in reply to a question on this very point, that "if these aircraft had not been built for other countries, they would not have been built at all." That can only mean either that they are not being built for the R.A.F. because that Service has not the man-power to use them, or that sufficient money is not available to buy them. In fact, both these reasons may apply. As regards the Auxiliaries, both the R.Aux.A.F. and the R.A.F.V.R. are 7½ per cent below their target strengths, and it is the volunteers of the R.Aux.A.F. who man the fighter-control units which are essential for the operation of fighter squadrons. Much more publicity and a more vigorous recruiting effort are required if these units are to be brought up to strength. But best of all would be a frank statement of the position and a clear lead on high authority, and we urge that this should be forthcoming without delay.

I now turn to the subject of bombers. The League has been pressing for a definite statement from the Government that the R.A.F. will have an adequate number of squadrons armed with the most up-to-date long-range strategic bombers. We therefore welcomed the recent statement by Lord Alexander in the House of Lords that it is the intention that the R.A.F. shall remain a balanced force and will not be deprived of bombers. But this statement was not precise enough regarding long-range strategic bombers. And there is one other most important point. Are we to *build* modern four-jet bombers? It has been stated that "research and development" on heavy four-jet bombers is to continue. But that is not enough. We must actually build these jet bombers. It is essential that our magnificent aircraft industry shall be maintained at its high level of efficiency, and that cannot happen if, through lack of orders, design teams are broken up, and numbers of other skilled men have to be paid off, and are lost to other industries, where their special skills decline.

There remains the question of air transport. Of all the fighting services the R.A.F. needs high mobility. You cannot possibly accept the idea of an air arm, having great Imperial responsibilities, tied entirely to surface transport moving at ten or fifteen miles an hour. Yet, again for lack of money and because of the shortage of manpower it has been necessary to cut down Transport Command and to cancel orders for transport aircraft with damaging effects on the British aircraft industry. Bear in mind that a fighter or bomber squadron can only fly *itself* overseas; there must be transport aircraft to fly its stores, its ground personnel, spare parts and workshop equipment. Then there are the demands of the Navy and the Army for air transport to be considered. Mobility is of the essence of modern war, and for a country which may have to meet aggression thousands of miles away it is a vital necessity. We urge the organization of the resources of the British charter companies and other private concerns, as an

(*Continued on page 134*)

THE AIR LEAGUE

THE Air League of the British Empire, founded in 1909 under the title of the Aerial League, exists "to secure the maintenance of adequate air forces and of reserves for Empire and Home defence, and to ensure the fullest development of British commercial air transport and private flying."

Deputy president is Air Chief Marshal Sir Philip Joubert de la Ferté and chairman Air Chief Marshal Sir Guy Garrod. Council members are G/C. W. N. Cumming, G. d'Erlanger, Maj. J. Vivian Holman, Sir Bertram H. Jones, F. W. Farey-Jones, W/C. A. Knowles Fitton, J. Lankester Parker, Maj. R. H. Mayo, G/C. C. S. Morice, R. V. Perfect, F. Gordon Petch, Eric Rylands, S. F. Sabin, Marshal of the Royal Air Force Sir John Salmond, Air Marshal Sir Robert Saundby, A. Cdre. Sydney Smith, W/C. R. H. Stocken, Lord Straboigi, the Duke of Sutherland and Maj. W. J. Taylor. Secretary-general is F. N. Hillier.

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To keep coastline and sea approaches secure from surprise attack, hours of constant patrolling are necessary. The stalking and destruction of the enemy is an operation demanding constant vigilance and alertness.

In the Avro Shackleton, specially designed and equipped for maritime reconnaissance, the crew work under really comfortable conditions with plenty of room to carry out their arduous duties. Far out over the patrol area, they are as fresh as when they started on flights of the longest endurance.

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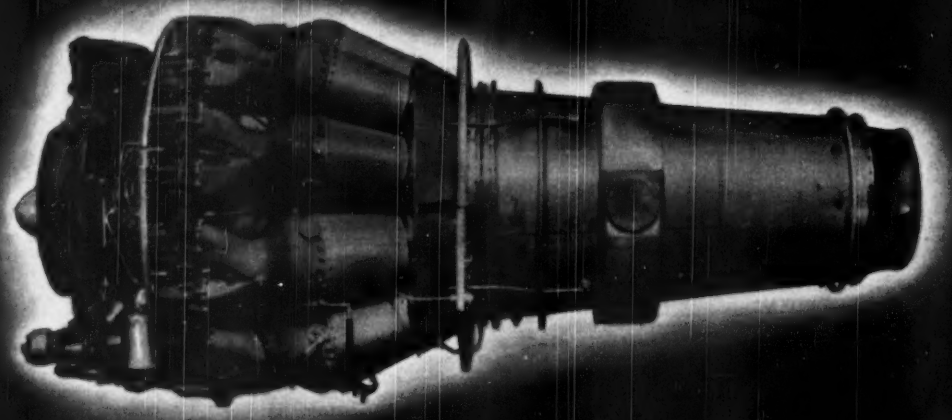

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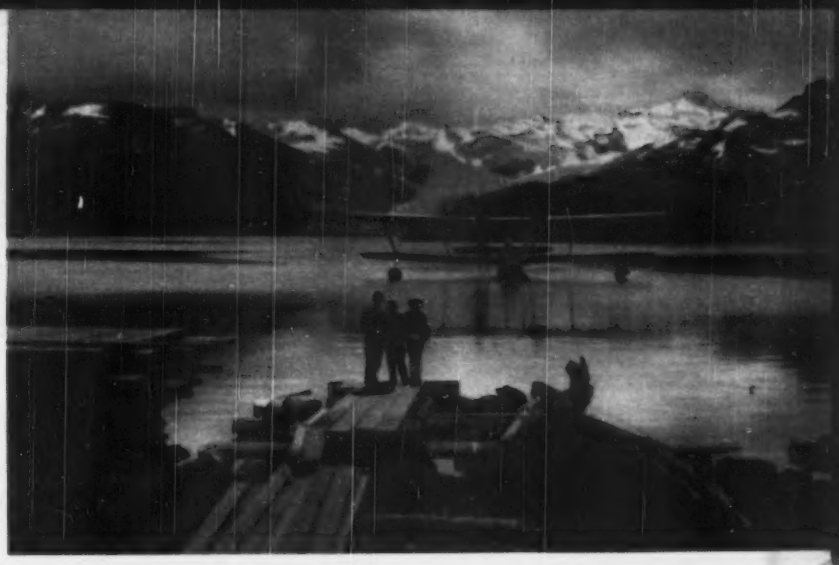


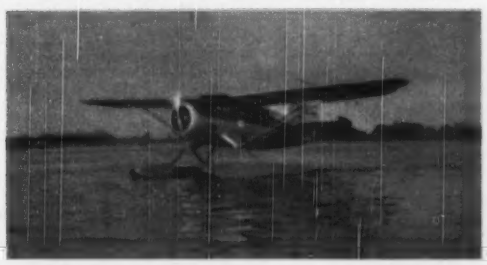
One of the company's Supermarine Stranraers on Garibaldi Lake, about 40 miles north of Vancouver.

QUEEN CHARLOTTE AIRLINES

Varied Operations of Canada's Third-largest Internal Operator

UNTIL a few years ago the more urgent transport requirements of many isolated communities along the bleak north-west coast of Canada were to some extent catered for by the operations of "bush" pilots. It was soon apparent, however, that if the traffic potential were to be fully developed the demands would be far beyond the scope of these worthy pioneers.

To meet the need for an integrated system of scheduled and charter services in these territories, Queen Charlotte Airlines were formed in May, 1946, around the nucleus of a small air-charter section which was then being run by a Vancouver radio firm. As the need was great, development was speedy, and present-day services utilize some 14 aircraft. The company is called upon to perform a very wide range of duties, and it is hardly surprising that its fleet should comprise such a varied assortment of types: there are two 20-passenger Supermarine Stranraer flying-boats (still giving excellent service), three Noorduyn Norsemen, two Stinson 108-2s, a Rapide and the prototype Fairchild Husky. The four last-named types are all mounted on floats: landplane commitments are fulfilled by five Anson Vs built by Federal Aircraft.



Typical of the company's operations is the Vancouver-Sullivan Bay service, which is flown every week-day; although this route is scheduled to take only three hours, it contains no fewer than thirty scheduled and "on demand" stops. A second main service is the six-times weekly Vancouver-Zeballos flight, which also entails a number of intermediate stopping points. Comox and Nanaimo, on Vancouver Island, are served by daily Anson flights, while Tofino is visited thrice weekly. Charter flights often go as far afield as Prince Rupert Island and Stewart (on the Alaskan border).

Last year the company carried some 35,000 passengers and 325,000 lb of freight, while passenger mileage amounted to nearly four million. In fact, in the short space of four years Queen Charlotte Airlines has grown to such an extent that it can now claim the distinction of being the third largest operating company in Canada.

(Above) The Queen Charlotte Norseman on the Fraser River.

(Below) The Rapide floatplane at anchorage on Sullivan Bay, and *Alberni Queen*, one of the five Canadian-built Anson Vs.

COMPOUND INTEREST

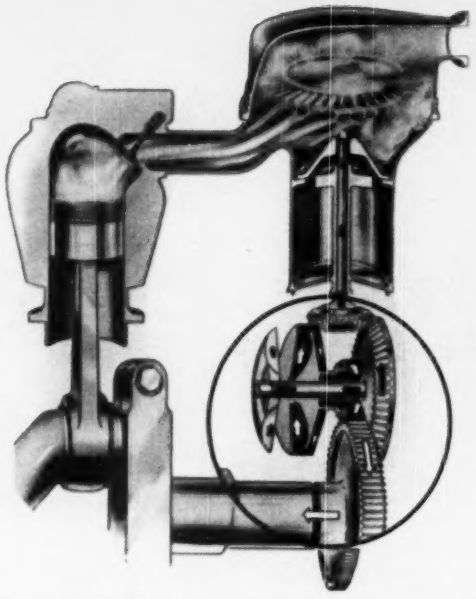
Turbo-supercharging and Compounding, Past and Present

THE insistent and perennial demand for more power in aircraft has been chiefly responsible for the enormous strides which have been made in the whole field of internal-combustion engines during the past four decades. Other demands have been made at the same time: demands for greater reliability, lower weight, reduced frontal area and so forth; but, primarily, the call has always been for more power. This is logical enough when it is remembered that the military factor has been, and still is, the principal influence in aeronautical development.

Although it can certainly be said that piston engines have been brought to a high pitch of efficiency, one of the inherent fundamental shortcomings of such power units is that a very considerable amount of the energy potential stored in the fuel is wasted down the exhaust pipe. It has, in fact, been calculated that the 2,700 h.p. 18-cylinder Wright Cyclone—which, by all canons of judgment, must be regarded as a fine example of its kind—loses heat energy by this means at the rate of 4,050 h.p. (One horse-power is the mechanical equivalent of the expenditure of heat at the rate of 2,545 B.Th.U./hr).

This appalling waste has plagued the engine designers for almost as long as the piston engine has existed, and innumerable and varied schemes have been proposed in an attempt to conserve or recoup the waste. Of all the schemes tried, however, one of the earliest has had the most consistent success, namely, the exhaust-turbo-supercharger. First tried toward the end of the 1914-18 war, supercharging through an exhaust gas-turbine is still practised to-day; each of the four Pratt and Whitney 28-cylinder Wasp Major engines of the Boeing Stratocruiser, for example, has one of its two superchargers driven from an exhaust turbine. When the practicability of the turbo-supercharger was proved and reliable operation had been achieved, it became obvious that more energy could be extracted from the exhaust than was necessary to drive the charging blower. The next step was to arrange for this surplus to be fed back to the engine shaft to augment the power output.

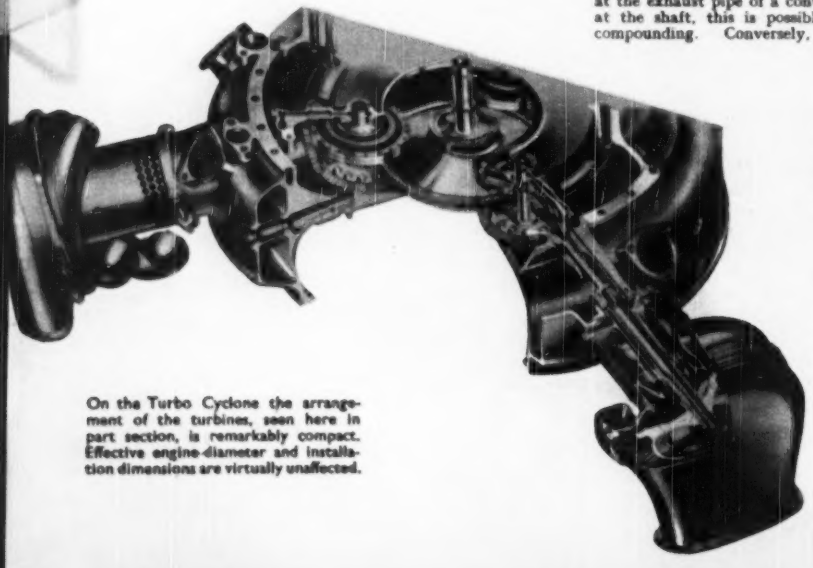
There is nothing incongruous in the use of a rotary mechanism for the second expansion stage of a reciprocating engine. In fact it may be counted as an advantage, as it is less bulky than a large low-pressure cylinder. The piston engine makes for efficient combustion at high compression ratios but is limited by its breathing capacity and its reciprocating motion. A gas turbine does not suffer those limitations, but operates at a lower compression ratio. As Dr. H. R. Ricardo has stated*:—"The piston engine is eminently suitable to deal with relatively small volumes at high pressure and temperature, and the turbine, by virtue of its high mechanical efficiency and large flow areas, to deal with large volumes at low pressures. Clearly, then, the logical development is to combine the two, in series, to form a compound unit."



Simplified representation of the Wright exhaust turbine and feed-back drive. (Gearing and hydraulic coupling shown enlarged).

In America, extensive studies have been made of compounding systems applied to existing piston engines. In Britain, on the other hand, the primary interest has been to investigate the value of compounding with a piston engine, usually of the two-stroke type, especially designed for the duty. In this role the piston engine can be relegated to a subsidiary position, all power from the engine shaft being used to drive the charging blower or blowers and all useful power being taken from the exhaust gas turbine or turbines. The engine thus becomes a dynamic, instead of the usual static, combustion chamber for a gas-turbine unit. As more energy is released at the exhaust pipe of a conventional engine than is delivered at the shaft, this is possibly the more logical approach to compounding. Conversely, however, a good case can be advanced for the use of a well-proved and fully developed piston engine on the ground of expediency.

The turbines used for such applications fall into two main categories. In the "blow-down" or "velocity" system individual pipes from the cylinders conduct the gas to the turbine and a relatively free expansion is permitted to avoid an increase in back pressure and possible adverse effect on engine output and cooling. With the alternative "steady-pressure" system the exhaust from a number of cylinders is collected in a chamber where a pressure is maintained before delivery to the turbine, and this pressure, of course, is exerted in the engine ports. Experimentally, both systems



On the Turbo Cyclone the arrangement of the turbines, seen here in part section, is remarkably compact. Effective engine diameter and installation dimensions are virtually unaffected.

* *Royal Aeronautical Society Lecture, March 13th, 1946.*

have been employed in series. The efflux from the "blow-down" turbine is collected and delivered to a "steady-pressure" turbine.

A third method has no mechanical feed-back of power to the engine shaft. Instead, the efflux from an exhaust gas-turbine driving a charging blower is discharged through a variable-area nozzle to furnish a propulsive thrust. Particularly suitable for high-speed operation at high altitudes, this is the system developed by Pratt and Whitney for their R-4360-VDT power plant, as installed, for example, in the Republic Rainbow. Using a General Electric two-stage turbo-supercharger in conjunction with the 28-cylinder Wasp Major engine, a supplementary thrust of 800 lb is obtained and altitudes of over 40,000ft can be reached.

Probably the most highly developed system utilizes blow-down turbines, as on the 18-cylinder Wright Turbo-Cyclone. This unit, scheduled for installation in the Lockheed P2V-4 Neptune patrol bomber and, experimentally, in the P5M flying boat for the U.S. Navy, is the first to pass a Service acceptance test and go into regular production for an operational aircraft. Readers will be aware† that the Wright engine has three exhaust gas-turbines mounted radially to the rear of the cylinder banks. As shown diagrammatically in the accompanying illustration, each turbine shaft transmits drive through a bevel reduction gear to the impeller of a hydraulic coupling. The coupling runner is assembled with a spur pinion engaging a common gear wheel on the engine shaft, giving a second stage of reduction. By the incorporation of a fluid coupling in the feed-back drive, engine and turbine systems are virtually isolated and there is no transmission of torsional vibration in either direction.

Each turbine receives exhaust gas from six engine cylinders, the ducts from pairs of cylinders being "siamesed" to give three gas inlets to the turbine. The phase relationship of the pairs of cylinders is such that the effect of individual gas ducts is maintained in operation.

Design and performance studies were begun in January, 1946, and preliminary tests were conducted with a nine-cylinder engine. By May, 1947, the first full-scale tests on an 18-cylinder unit were undertaken, and in August of that year the U.S.N. awarded a contract for a substantial production for development and testing purposes. In October, 1949, the Turbo-Cyclone passed a 50-hr approval test and, later, flight-testing in the nose of a B-17 bomber was initiated. A 150-hr acceptance test was completed in March, 1950, and to date a total of more than 3,000 hours of test running has been accumulated.

Under take-off conditions the compounded engine is rated at 3,350 h.p.—an increase of 20 per cent over that of the basic engine. Power output at normal ratings is increased 14 per cent with low boost and 28 per cent with high boost. For economical operation, the basic engine output can be maintained with a 20 per cent reduction in total fuel consumption. Consequently, with the same initial fuel load, the range can be extended or, for the same range, the useful load can be increased. Specific weight is slightly reduced, the figure being approximately 1 lb/h.p.

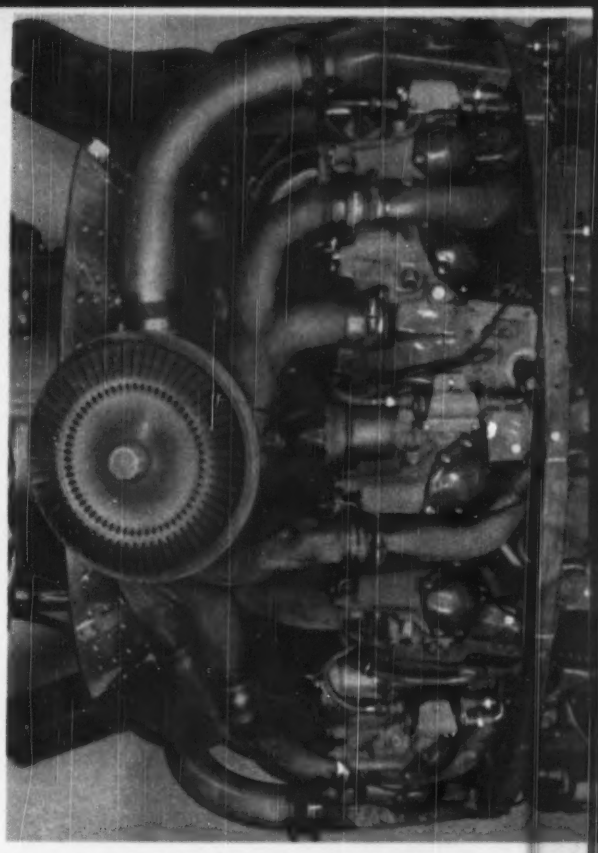
Operation of the turbines and the power feed-back is fully automatic and no additional controls are required. Installation of the engine is virtually unaffected, and the turbines serve usefully as silencers and flame suppressors.

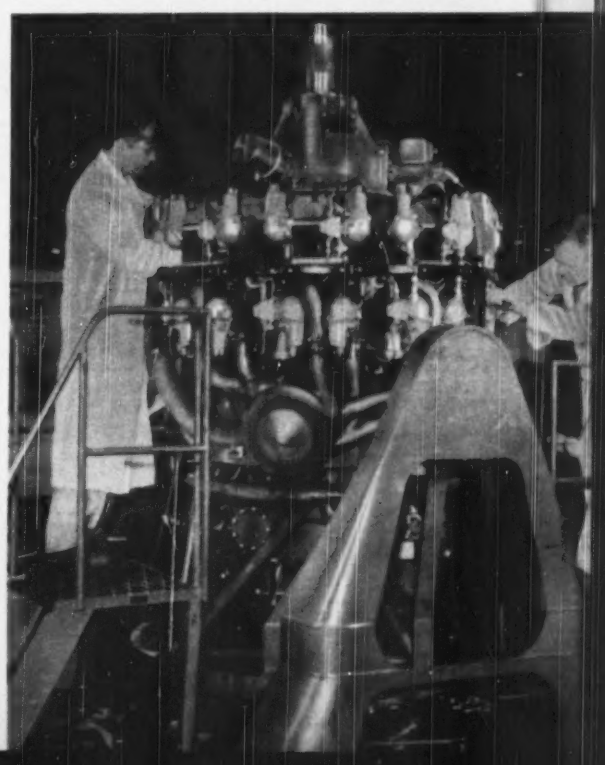
As an example of the "steady pressure" system, the Allison V-1710-127 engine may be quoted. The basic 12-cylinder vee-type engine was supercharged by two centrifugal blowers. Both were driven from the engine shaft, the first through a variable-speed hydraulic coupling and the second by fixed-ratio gearing. Large ducts, each collecting the exhaust gas from a bank of six cylinders, were connected to furnish a single entry to a General Electric turbine which fed back power to the engine shaft through constant-mesh, fixed-ratio gearing. Tests under simulated altitude conditions showed that at full throttle, 2,700 r.p.m., at 25,000ft, the power output was raised by 36 per cent, while the specific rate of fuel consumption was lowered from 0.57 lb/h.p./hr to 0.45 lb/h.p./hr.

In 1946, however, Allison decided that as a high gas temperature (1,800 deg F-1,950 deg F) at the turbine inlet was necessary to realize the advantages of compounding, it was more advisable to concentrate their energies and resources on the development of the airscrew-turbine. As a consequence, this interesting experiment was abandoned.

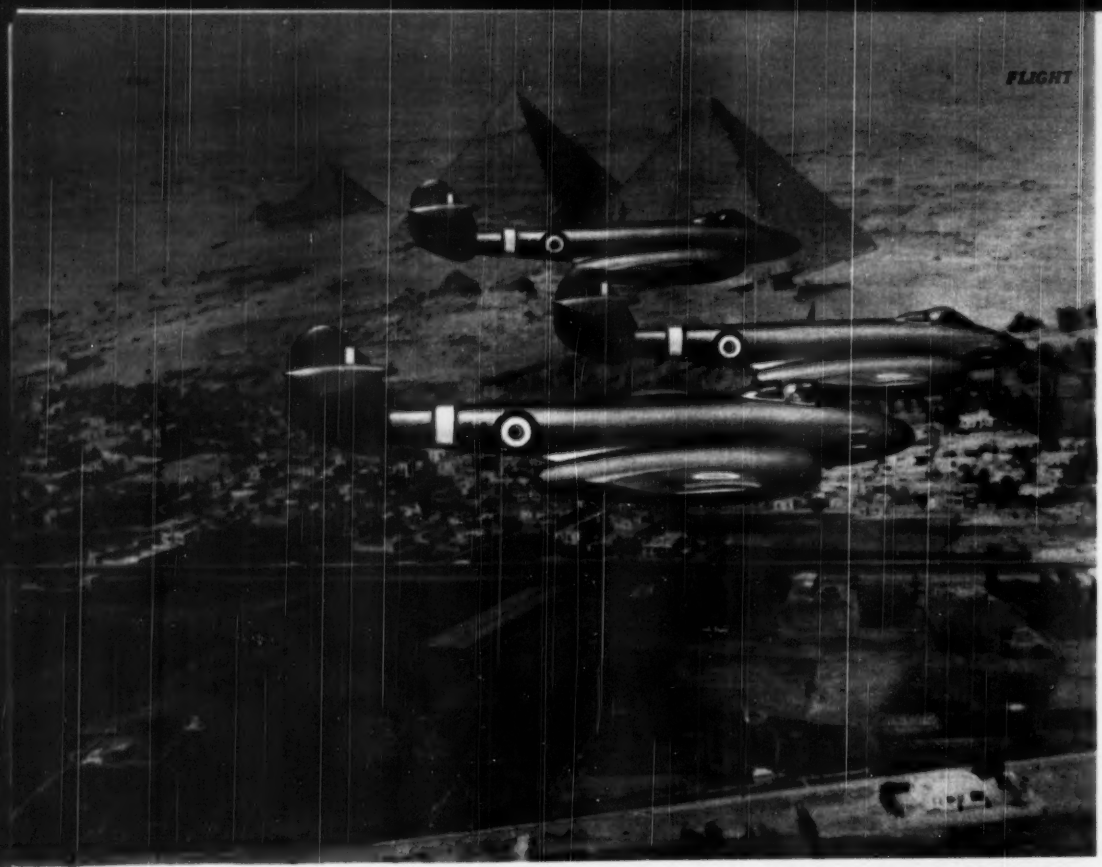
We may expect keen competition to develop between protagonists of the turboprop and of the compounded unit for installation in the special types of Service aircraft in which a low specific fuel-consumption rate is a prime requisite. It must not be forgotten that the gas turbine can be compounded, with two or three stages of compression and two or three stages of expansion. Indeed, this is the technique for stationary and marine gas-turbine plants.

† "*Flight*," *October 7th, 1949 (p. 436) and June 8th, 1950 (p. 687).*





Close-up of one of the turbines on the Turbo-Cyclone. The pipe entering the turbine casing vertically from the top conducts cooling air to the rotor assembly. (Below) An example of the Wright compounded engine, now in regular production, nearing the end of the assembly line at the makers' factory at Wood Ridge, New Jersey.



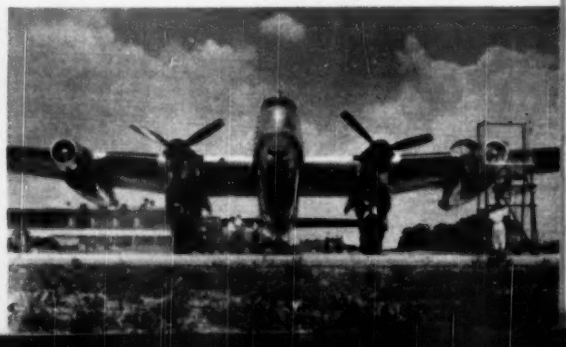
It would be difficult to conceive a more extreme contrast between ancient and modern than the striking study above : the largest of the Giza Pyramids in the background is at least 5,500 years older than these Gloster Meteors of the Royal Egyptian Air Force.

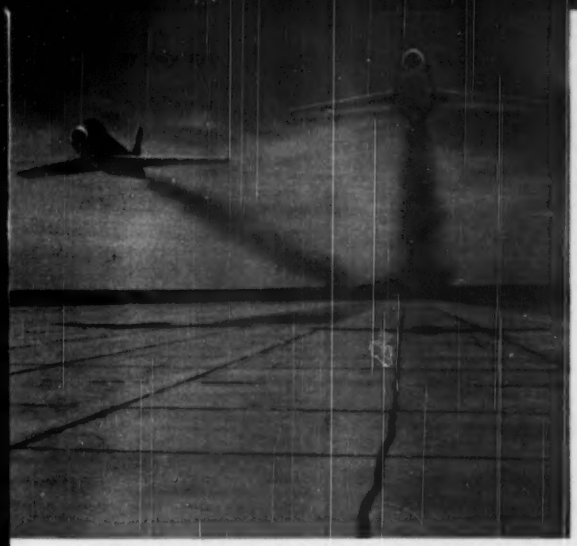
(Below) This scene from Buenos Aires provides a comparison in size between the trim D.H. Dove of G/C. D. S. G. Honor, the British Civil Air Attaché there, and a new Stratocruiser for Pan American World Airways—christened *Clipper Friendship* by Senora Peron.

PICTURES OF THE WEEK

Features distinguishing the new Meteor 9 for fighter-reconnaissance duties are shown in this new air-to-air view. Immediately apparent are the longer nose, with its camera-positions, "cleaner" cockpit and—as first applied on the Mk. 8—square-cut tail unit.

(Below) A new aspect of the Lancaster modified by Avro Canada as a test-bed for the powerful Orenda turbojet. Two of these axial-flow units, as specified for the same company's CF-100 night and all-weather fighter, replace the outboard Merlins of the "Lanc."





Trails of dark smoke from their tailpipes trace the speedy path of two North American F-86 Sabres of the U.S. Air Force's 81st Fighter-Interceptor Group, impressively pictured above their base at Moses Lake airfield near Washington, DC. The Group's duty is defence of N.W. Pacific cities. (Top, right) Six more Sabres of the 81st Group, in dazzling war-paint, are seen lined up at Moses Lake. The Sabre is the fastest fighter in service, and holds the world's speed record of 670.981 m.p.h., established in September, 1948.

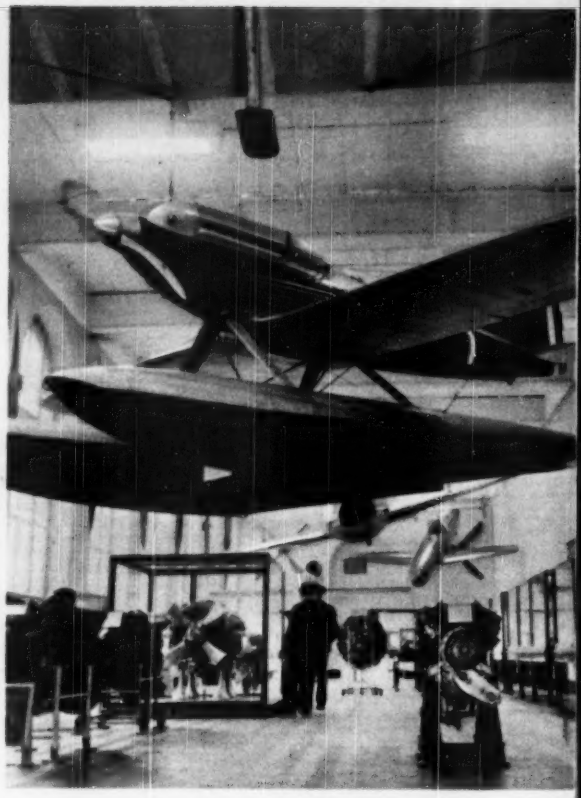
(Below) this new aerial view of London Airport, by the Air Survey Company, brings up to date the progress-record of a great project. Half of the diamond-shaped central terminal area is now clearly defined. The ultimate layout was fully described and illustrated in a special report published in *Flight* of December 22nd, 1949.

A scene from Somerset, where the Westland Aircraft Company is producing S-51 helicopters, Service and civil, for home and overseas. Two Dragonfly H.C.2 military variants are seen at rest while a civil S-51 "egg-beats" overhead. Alvis Leonides engines power all production-type Westland-Sikorsky S-51 helicopters.

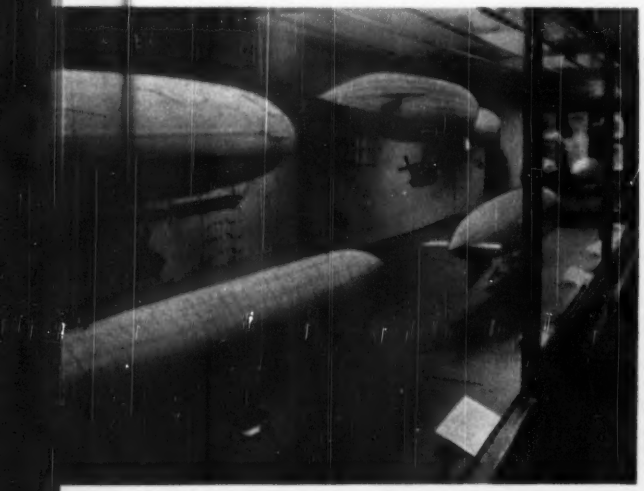
Aeronautical History Enshrined

Round the Newly Housed National Aeronautical Collection, South Kensington, with a *Flight* Camera

AS recorded in *Flight* of June 29th, the aeronautical Section of the Science Museum, South Kensington, London, now has a new home in the Western Galleries, a short distance from the main building. Once the home of the old Imperial War Museum, and since used as a store, the galleries have lately been modernized and redecorated; dove-grey walls and light from large windows and fluorescent fittings now make a perfect background to —in particular—the brightly painted modern aircraft and models and highly finished sectioned engines. From the work, in model or actual form, of the earliest pioneers to exhibits such as a Japanese *kamikaze* or suicide aircraft (perhaps the supreme example of misplaced ingenuity), the Museum presents a fascinating cavalcade of aeronautical progress. It is open (admission free) on week-days from 10 a.m. to 6 p.m., and from 2.30 to 6 p.m. on Sundays.

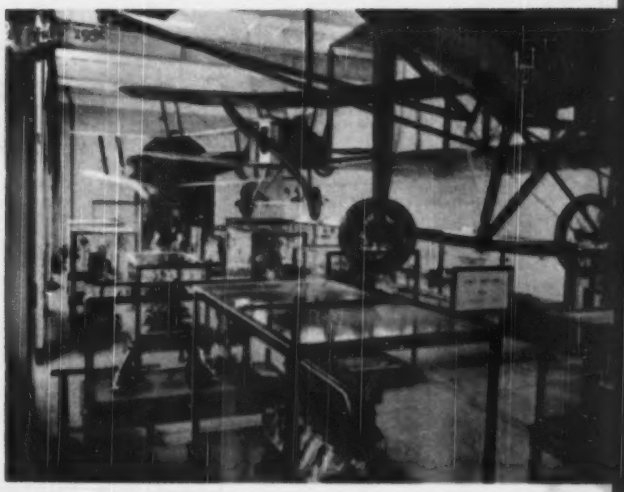


The Supermarine Rolls-Royce S.6B (which won the Schneider Trophy in 1931 at 340 m.p.h.), a beautiful aircraft even by to-day's standards, dominates this view of the farthest gallery. In the background are the Gloster E.28/39, the Whittle W.1 turbojet, a Japanese Baka *kamikaze*, and some other recent acquisitions.

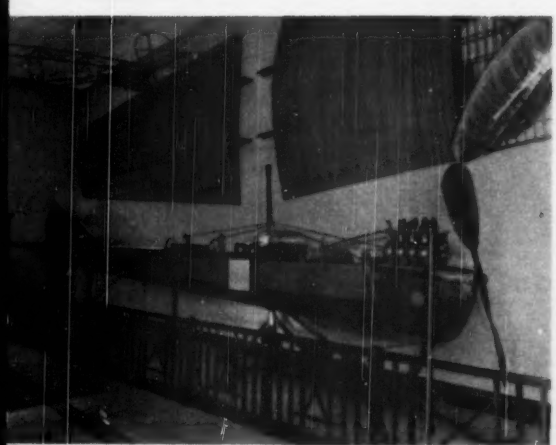


(Above) Magnificently constructed model dirigibles appear almost to be floating in a glass-case hangar. In the foreground are the 1904 Lebaudy (France), which flew for 3 hr 11 min in 1905, and, above it, the German Gross military semi-rigid of 1912-13; beyond, the German Parseval of 1911, and (below it) the French Zodiac of similar date. (Right) Imaginative grouping: A Dove, Viking and Heron to the same scale (1 : 48) as a rather severely aerodynamic model of the Brabazon. Beyond is a modern-helicopter exhibit.

(Right) Seen beyond the wheels of Cody's third biplane (1911) are the dainty S.E.5A fighter of World War I and *Jason*, the Gipsy Moth used by the late Mrs. Mollison (then Miss Amy Johnson) on her Australia flight of 1930. Examples of earlier aircraft engines occupy the glass cases.



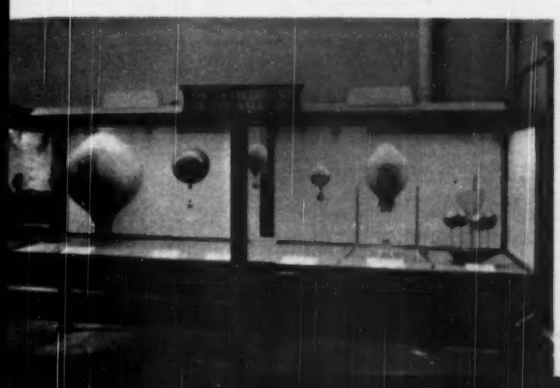
Frost's ornithopter, or flapping-wing machine, of 1902 (3 h.p. single-cylinder engine). The wings, each of 8ft span, are made of cane, silk and hundreds of real feathers. There is no record of its having flown. An earlier Frost ornithopter—weighing 650 lb, steam-driven and man-carrying—is in the Shuttleworth Collection.

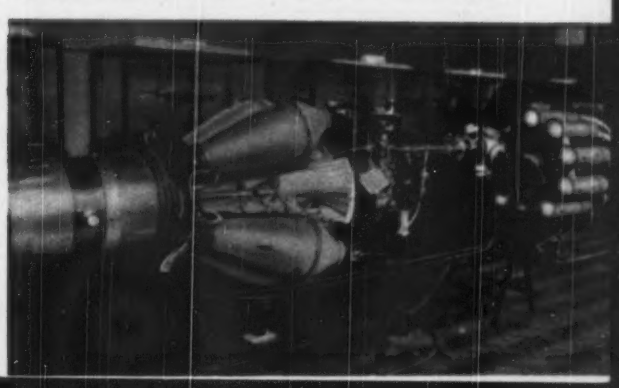


(Left) Loaned to the Museum by Blackburn and General Aircraft, Ltd., this is the only complete Antionette monoplane in existence. With a 50 h.p. engine, it was flown at speeds of up to 47 m.p.h. by Hubert Latham. On the wall are the partly stripped wings.

(Below, left) Very early days : From de Lana's proposed airship (1670) to the " modern " spherical balloon ; on the extreme left is the largest (30,000 cu ft) Montgolfièr hot-air balloon, which in 1784 carried seven persons to 3,000ft in an ascent from Lyons.

(Below, right) Assured of a place in history is the world's first turboprop : the Rolls-Royce Trent (part-sectioned). Beyond is the historic Whittle W.1 turbojet ; its companion unit, the W.1X, was recently presented to the Smithsonian Institute.





SIDEWASH and STABILITY

A Study of Wing/Fuselage Interference Effects

By H. K. MILLICER, Dpl. Ing., M.Sc., A.F.R.Ae.S.

IN the course of various projects it has often occurred to the writer that an article destined to clarify certain stability problems might be of some general aeronautical interest.

During the initial project design of a given aircraft, the proper determination of wing/fuselage junction, and the size and shape of fin and rudder, are both of paramount importance to the stability and controllability. The apparent differences between a good and a bad design might be very small indeed; but, nevertheless, it may well be detail design which eventually determines whether the aircraft is to be a success or a failure. To cite a hypothetical case, a few extra degrees of rudder travel might be necessitated by take-off safety-speed demands, but those same few degrees of movement might well be conversely detrimental in producing fin stall. If, on the other hand, the shape of the fuselage and its canopy were properly determined in the first place relative to the fin and its moment arm, the subsequent expenditure of much time and thousands of pounds in test flying and modifications would not be necessary. Nowadays, probably more than ever, it behoves designers and their staffs to think very carefully indeed before committing any lines to paper.

Before continuing this discussion it should perhaps, be stated that the subject-matter has purposely been limited to give a brief explanation of (i) why the fuselage effect is the most important in lateral stability, and (ii) how the wing/fuselage interference affects stability; in addition, there are a few design do's and don'ts relative to the attainment of good lateral stability for a given aircraft.

From the very earliest days of flying, aircraft stability criteria have always been referred to the wing—a logical enough practice in the past, when aircraft had more wing structure than anything else. Nowadays, however, when fighter types resemble projectiles, and airliners have bodies like monstrous whales, and in each case the amount of wing is kept to a minimum, it is, surely, high time to stop using wing size and shape as data for proportional coefficients and, instead, adjust the empennage to the proportions of the fuselage.

It is a matter for arithmetical proof that, if the area of a geometrically similar wing is halved—thus doubling the wing loading for a given aircraft—the tail volume coefficient is nearly trebled ($2\sqrt{2}$ to be precise). This, however, entirely neglects the influence of the fuselage as a main destabilizing factor. The whole thing is essentially a matter of sensible proportion, and with the common trend toward the use of ever greater wing loadings there must, inevitably, be a concurrent increase in tail surface areas relative to the diminishing wing area. Some of the comparatively recent monsters might have been designed to Picasso requirements instead of those of (P)I.C.A.O.

There is also much cause for wonder at the way in which the air somehow manages to follow their detail contours. It is worth remembering that, once the flow has broken away—for example, on the hard edge of an optically flat windscreen—nothing save boundary-layer suction will make it adhere to the surface again. Such discontinuities can have far-reaching results, and it is frequently disruption of the airflow in front of the aircraft c.g. which is responsible for such unpleasant "after-effects" as snaking and rudder locking. On one particular aircraft, to the writer's knowledge, the directional stability coefficient (n_v) for small angles of yaw turned out to be only one-third of its proper value at large angles of yaw, owing to an aerodynamically bad canopy design. Another aircraft with a sharp-cornered windscreen was found to have a fin and rudder efficiency $\left(\frac{P}{q}\right)$ of less than 50 per cent at some stations, and an average of but 70 per cent for the whole. On this basis, about 30 per cent of the fin and rudder area and weight was useless, and on the aircraft concerned this was equivalent to roughly 2 per cent of the payload.

There is a simple recipe for canopy shapes which do not spoil the drag and stability of an aircraft (ref.: N.A.C.A. T.R. 730). The canopy corners should be rounded off at a minimum radius of one-quarter the canopy height or width. Failing this, and when an optically flat panel must be used, it is the writer's contention that a 15-deg three-dimensional intersection-angle is about the maximum that the airflow can follow. Sharp-sided bullet-proof panels have caused many a high-speed aircraft to snake, and many of the faster modern types are now being fitted with curved fairing panels.

Generally speaking, the smoother the airflow around the fuselage nose, the better will be the stability and drag: after all, the fuselage can justifiably be regarded as an aerofoil section with a large nose overhang. On this basis, the area of the fuselage forward of the c.g. is equivalent to an area in front of the hinge of a control surface, and is equally destabilizing, i.e., over-balancing. Extending the analogy gives the conclusion that the sharper the fuselage nose the less overbalance is likely to occur. Whereas the fuselage with a bulbous nose—more particularly those of parabolic derivation—will reach the instability threshold and thus "over-balance" if the c.g. is more than one-fifth of the total length, a fuselage with a sharper (elliptical) nose profile can be stable with a c.g. position at one-quarter of the total length. That both weight and drag of tail surfaces can be saved by a clean front fuselage design can, therefore, safely be assumed.

As to the size of the vertical tail surface(s) as determined by the fuselage dimensions, a valuable formula was initiated by Gilruth. He stated that, in order to avoid fin stall and aerodynamic lock-over by the rudder, and also to ensure good all-round lateral stability, the product of fin and rudder area times its arm should not be less than half the product of the fuselage length times the square of its depth. On application of this formula to various modern aircraft, however, the writer found it inadequate, and the required coefficients for successful aircraft turned out to be something over 0.6 for single-engined types and 0.8 for multi-engined types. Furthermore, the Gilruth formula does not take into account the shape of the front fuselage.

There is ample evidence to show that most of the damage inflicted on the airflow is done at the front of the fuselage and, in addition, sidewash is most active in front of the wing, $\frac{d\Sigma}{d\beta}$, being two or three times greater in front than behind it. On the basis of this theory, the writer derived the following formula for the size of the fin and rudder relative to the size

TABLE I: FUSELAGE/FIN RELATION, AIRSCREW-DRIVEN AIRCRAFT

Aircraft	Engs.	Fin (s) and Rudder(s)	Wing Posn.	$\frac{S_{FR} \times L_{FR} \times L_{FR}}{S_{FF} \times S_{FF}}$
Lockheed Constellation	4	3	low	3.95
Avro York	4	3	high	2.39
Bristol Brabazon	4×2	1	low	3.31
Handley Page Hastings	4	1	low	2.21
Vickers Viscount	4	1	low	1.7
Boeing B-50	4	1	mid	4.22
Bauman Brigadier	2	1	mid	2.5
Bristol Warfarer	2	1	high	2.15
Convair 240	2	1	low	2.5
Airspeed Ambassador	2	3	high	3.34
Martin 2-0-2	2	1	low	2.91
Douglas Super DC-3	2	1	low	2.44
Percival Prince	2	1	high	3.2
Lockheed Neptune	2	1	mid	4.64
Short Sturgeon	2	1	mid	5.35
Consolidated Vultee B-36	6	1	high	3.46
North American Navion	1	1	low	2.51
N.A.C.A. T.N. 1	1	1	high	2.43
N.A.C.A. T.N. 2	1	3	low	1.99
N.A.C.A. T.N. 3	1	1	high	3.87
N.A.C.A. T.N. 4	1	1	high	2.32
N.A.C.A. T.N. 5	1	1	high	2.91
Aeronca Chief	1	1	high	3.35
Bellanca Cruisair	1	3	low	2.11
Cessna 120	1	1	high	2.86
Piper Vagabond	1	1	high	3.18
D.H. Beaver	1	1	high	3.15
Saab Safir	1	1	low	3.04
Sokol Mraz	1	1	low	2.98
Macchi MB 308	1	1	high	2.84
Douglas Skyraider	1	1	low	2.46
D.H. Chipmunk	1	1	low	3.82
Avro Athena	1	1	low	2.8, 1.35 before modification
Boulton Paul Ballial	1	1	low	3.22
Hawker Sea Fury	1	1	low	2.98
Fairchild T-31	1	1	low	2.12
Fieseler Storch	1	1	high	4.25
Consolidated Vultee L-13	1	1	high	2.6

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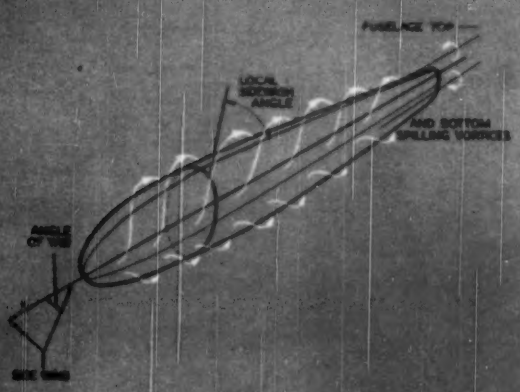

Fig. 1. Fuselage in yaw, without a wing.

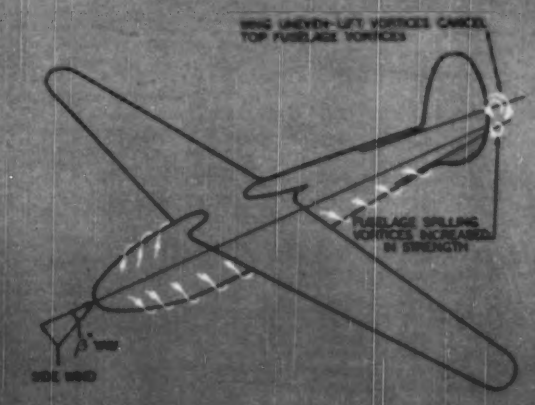

Fig. 3. High-wing effects on fin and rudder.

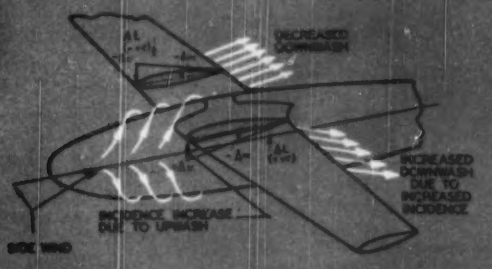

Fig. 2. High-wing interference on fuselage.

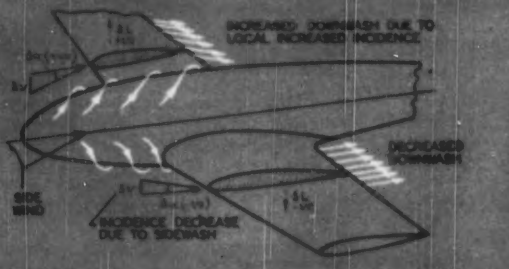
INCREASED DOWNWASH DUE TO LOCAL INCREASED INCIDENCE
DECREASED DOWNWASH
SIDE WIND
INCIDENCE DECREASE DUE TO SIDEWASH

Fig. 4. Low-wing interference on fuselage.

SIDEWASH and STABILITY . . .

and shape of a given fuselage:—

$$\frac{S_{FR} \times L_{FR} \times L_{FF}}{S_{FF} \times S_{FR}} \geqslant 2.0 \text{ for jet aircraft}$$

$$\geqslant 3.0 \text{ for airscrew-driven aircraft}$$

where S_{FR} is fin and rudder area above the fuselage, L_{FR} the moment arm from the aircraft's c.g. to the fin and rudder quarter mean chord, S_{FF} and S_{FR} are the areas of the fuselage in front of the wing in plan- and side-view respectively, and L_{FF} is the front fuselage length. It should be stated, however, that higher values of this coefficient need to be used if the aircraft is required to fly safely close to the stall. Another thing is that a low-wing aircraft requires 20 to 30 per cent less fin and rudder area than does a high-wing aircraft, owing to greater fin efficiency. By the same token, still less area or arm need be used with a pusher power installation.

In Tables 1 and 2 are listed over 50 aircraft, many of which have been built in some quantity and which all accord well with this formula.

The justification for the formula is based on wing/fuselage interference and its effects on sidewash. A fuselage by itself,

TABLE II: FUSELAGE/FIN RELATION, JET AIRCRAFT

Aircraft	Engs.	Fin(s) and Rudder(s)	Wing Posn.	$\frac{S_{FR} \times L_{FR} \times L_{FF}}{S_{FF} \times S_{FR}}$
D.H. Sea Vampire	1	2	mid	0.995
Hawker P.1040	1	1	mid	1.21
Hawker P.1052	1	1	mid	1.04
Vickers-Supermarine Attacker	1	1	low	2.4
Avro Canada Jetliner	4	1	low	2.13
Chance-Vought Pirate	1	1	low mid	2.50
Douglas Skystreak	1	1	low	1.58
Grumman Panther	1	1	low mid	2.68
Lockheed Shooting Star Trainer	1	1	low	0.837
McDonnell Banshee	2	1	low	2.38
Martin XB-48	6	1	high mid	1.715
Republic Thunderjet	1	1	low mid	1.84
Lockheed Shooting Star	1	1	low	1.40
Gloster Meteor 8	2	1	low	2.66
Gloster Meteor 4	2	1	low	1.915

when yawed, develops a much larger local angle of incidence than its geometrical angle of yaw, as shown in Fig. 1. This actual angle of yaw on the top or bottom of a yawed fuselage is called "sidewash" and is greatly affected by the presence of the wing. On a high-wing aircraft the effectiveness of the normal fin is reduced and, in fact, ventral fins are more helpful owing to an increased sidewash underneath the fuselage in the yawed condition, *vide*, Figs. 2 and 3. With a low-wing configuration, however, the effectiveness of the normal type of fin is not reduced but, on the contrary, may sometimes be increased. On the other hand, the increased top sidewash on the fuselage is liable to cause an early fin stall. In this connection a dorsal fin is frequently helpful on a low-wing type, first by making use of fuselage-top sidewash, and thus slightly increasing weathercock stability, and, secondly, by preventing an early fin stall as a result of lowering the aspect ratio of the fin: this is shown in Figs. 4 and 5.

The spanwise lift distribution of the wing when yawed differs according to the relative position of fuselage and wing. Placing the wing on top of the fuselage gives a rolling moment when yawed approximating to the effect of about 3 deg dihedral, i.e., the wing-tip yawing forward tends to rise. Conversely, if the wing is below the fuselage, the opposite effect is produced, acting as negative dihedral, or anhedral, again of the order of -3 deg.

An explanation of the effects can be given as follows: first considering a bare fuselage in an airstream (Fig. 1). Pressure is created on the windward side and suction on the leeward side when the fuselage is yawed. The fuselage can then be regarded as an aerofoil section of a very small aspect ratio ($AR << 1$), and the airflow over its "tips"—the top and bottom of the fuselage—will produce two vortex lines of somewhat similar to wing-tip vortices. These two lines of spilling vortices play an important role in further argument. As air is spilling over the top and under the bottom of the fuselage, its local angle of yaw (sidewash) is increased.

If the fuselage happens to be bulky, the sidewash may considerably exceed the free-air incidence; that is to say, if the fuselage angle of yaw is, say, 15 deg, it can happen that the angle of sidewash on the top or bottom of the fuselage may be 30 deg or more. However, sidewash can be turned

SIDEWASH and STABILITY . . .

to good account in making stable an otherwise unstable fuselage. By fitting small dorsal or ventral fins, for example, the unstable yawing moment can be reduced and, in fact, a low-drag solid-of-revolution fuselage can be made neutrally stable by means of small dorsal and/or ventral fins, only 5 per cent of the fuselage diameter in height.

When a wing is placed on top of a fuselage, it acts similarly to an end-plate at the wing-tip, i.e., it tends to damp out the spillage of tip vortices. Hence the fuselage *top* spilling vortices will be eliminated by the high-positioned wing, as shown in Fig. 3. This can be explained in another way. The local sidewash effectively increases the wing incidence on the windward side of the yawed fuselage, whilst simultaneously decreasing the effective incidence on the lee side of the fuselage (Fig. 2). Both the change in effective wing incidence and the corresponding pressure distribution produce a change in wing lift and the spanwise distribution of downwash, and have the effect of inducing a vortex line behind the wing. This vortex line has a clockwise rotation for a high-wing monoplane which is yawed to starboard, i.e., as in Fig. 3.

Such clockwise-rotating vortices are opposing the fuselage-tip spilling vortices. The result is that the vertical fin, when conventionally placed above and behind a high wing, receives less sidewash than it would if the wing were deleted. As a consequence, it can be stated that the high-wing aircraft has less effective local fin incidence owing to the presence of the wing. By contrast, the fuselage-bottom spilling vortices are increased in strength, and placing a part of the vertical fin in this region—i.e., a ventral fin—is beneficial from the point of view of stability. This fact has long been recognized by aeromodellers, and in following the theory the writer modified a wind-tunnel model of a high-wing aircraft and, by adding only 3 per cent of the fin area below the fuselage, increased the aircraft's directional stability coefficient by 10 per cent.

The uneven wing-root lift and downwash distribution in yaw, whilst normally being detrimental to directional stability, could nevertheless be utilised effectively to increase stability if the opposite downwash distribution were artificially produced. This could quite easily be done by the use of inboard flaps as ailerons. Such a scheme was embodied on one of the German sailplanes where the flaps were used for directional trim on the ground; more recently, a similar line has been followed on two new American aircraft, the Martin XB-51 and the highly manœuvrable Koppen Helioplane. In addition, the Swedish SAAB J-29 jet fighter obtains its phenomenal rate of roll (220 deg/sec) by the use of flaps as ailerons. The resultant increase of sidewash is sufficient to counteract the adverse yawing moment of the normal (outer) ailerons. That the aircraft cited in this connection are all of high- or shoulder-wing type is, perhaps, significant, and it is uncertain what effect the flap-aileron arrangement would have on a long-wing-aircraft in terms of yawing moment.

It appears that, for low-wing aircraft, the presence of the wing has an effect on the fuselage quite the opposite to that obtained from a high-wing layout. As may be seen from Fig. 5, the two vortex lines on the bottom of the fuselage rotate in opposite directions, i.e., the fuselage bottom spilled

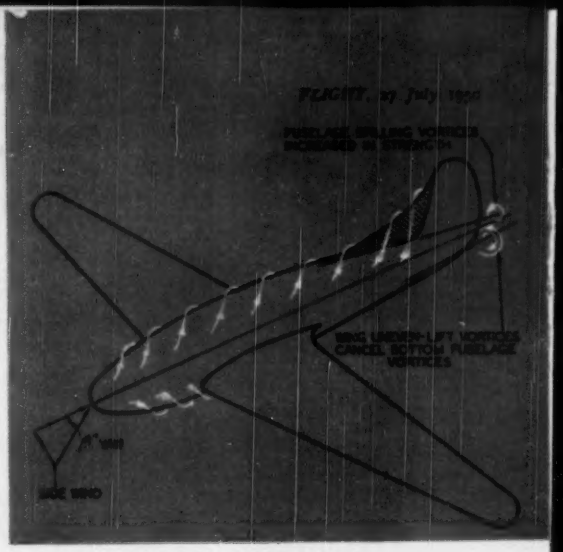
FLIGHT, 23 July 1954
FUSELAGE SPILLING VORTICES INCLINED IN SIDEWASH
WING UNEVEN-LIFT VORTICES CANCEL BOTTOM FUSELAGE VORTICES
SIDE WIND

Fig. 5. Low-wing effect on fin and rudder.

vortices and the wing-root uneven lift vortices cancel each other, but the resultant fuselage bottom turbulence misses the fin.

With regard to sidewash turbulence and its powerful effects, it may be remembered that the sidewash on the Mustang I was powerful enough at high speeds to break the tailplane, and some loss of pilots' lives was attributed to this effect: the powerful sidewash was due to high rudder-angles occurring inadvertently at high speeds, and the addition of a small horn on top of the rudder, together with a dorsal fin, rectified the trouble completely. (This modification—which was devised at Farnborough—was subsequently incorporated on all Mustang series.) In a spin, sidewash can also produce an uneven spanwise tail lift distribution sufficiently large to buckle the tailplane spar shear skin. It is these considerations which have led the Ministry of Supply to specify the requirement calling for a tailplane structure to bear an uneven spanwise upwash and downwash distribution.

Summing up, it can be said that wing/fuselage interference has pronounced effects on the lateral stability, manœuvrability and safety of conventional aircraft. If understood and utilized properly, or induced artificially, this interference can be made to work according to the designer's will and not against it. Generally speaking, low-wing aircraft require less fin and rudder area than do high-wing aircraft, but require more dihedral. On the other hand, the low-wing type is the more likely to have an easily stalling fin and aerodynamic rudder locking. By contrast, on a high- or shoulder-wing aircraft, the aileron-like use of flaps offers an advantage in producing a favourable yawing moment due to induced sidewash.

Steel-Hard Aluminium

A NEW hard coating for aluminium, which should make this metal eligible for many applications hitherto monopolized by steel alloys, has been developed in the engineering laboratory of the Glenn L. Martin Company. Standard tests performed on a Taber abrasion tester have shown that this new coating—known as "MHC" finish—possesses a remarkable resistance. After 50,000 cycles, it is stated, the material showed only half as much wear as did cyanide-hardened steel.

Although laboratory development of the process has been under way for over two years, the full range of practical application has only just begun to be explored. Among items to which coatings have been applied with success are gears and pinions, surveying instrument parts, turbine impeller blades, hand tools and the leading edges of high speed aerofoils, as well as helicopter rotor-blade tips. It is claimed that "MHC"-processed surfaces also afford a definite margin of heat-insulating protection to the base aluminum when exposed to transient high temperatures.

To take advantage of the saving in weight, "MHC"-finished aluminium is already being used for certain moving parts of Martin aircraft, as well as for static surfaces that are exposed to severe wear.

Application of the hard coating is by means of an electro-chemical process, which creates a non-metallic, highly heat-refractive surface which is strongly bonded to the base metal. Coating thicknesses range from 0.0001in to 0.006in, with a thickness of 0.002in usually required for abrasion-resistant purposes; surface smoothness, it is reported, is in general closely maintained by the processing.

LIGHTWEIGHT ALKALINE BATTERIES

WHAT must constitute an important advance in battery development is the production, by Venner Accumulators, Ltd., Kingston By-pass Road, New Malden, Surrey, of a lightweight alkaline accumulator.

Now being marketed in five capacities of from 0.5 to 10 a.h., and 16 different sizes, these little batteries have a weight of from one-third to one-fifth that of orthodox types of comparable capacity, are of half the size, and are claimed to have much longer life than lead-acid types.

It is suggested by the manufacturers that the lightweight accumulator should have a considerable number of applications in aircraft-interior services, and it is understood that the A.R.B. is being approached for type approval. Voltages range from 1.5 to 12v.

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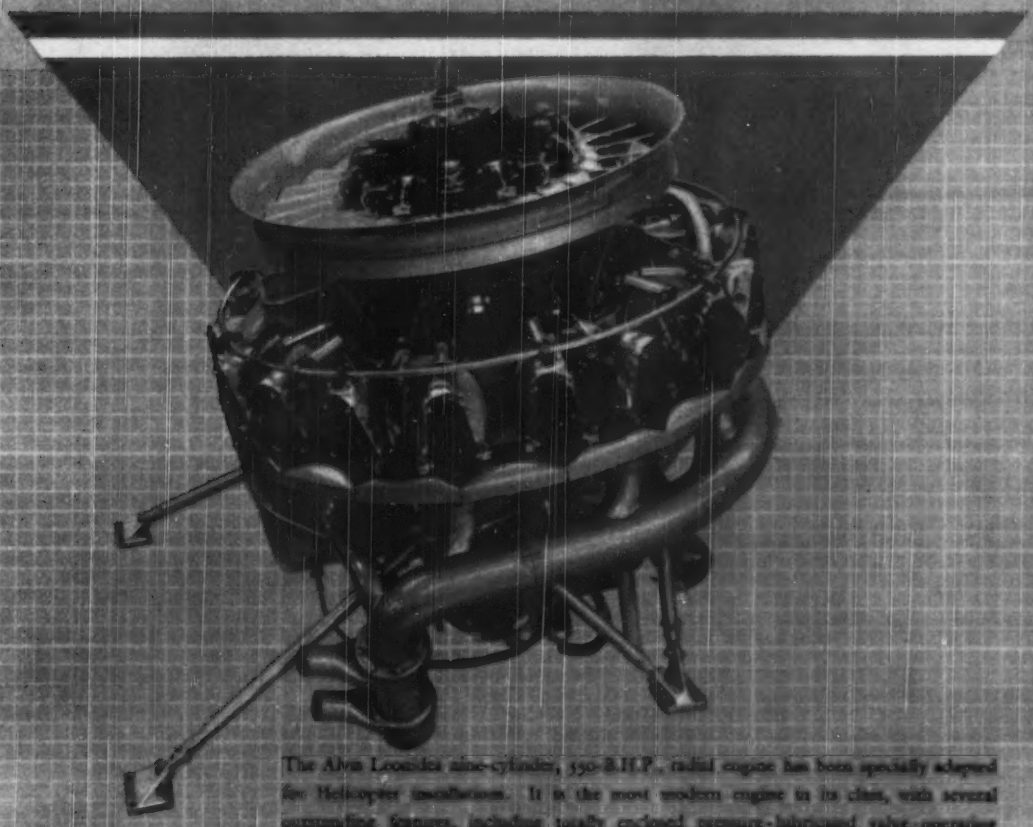

The Alvis Leonides nine-cylinder, 550-B.H.P., radial engine has been specially adapted for Helicopter installations. It is the most modern engine in its class, with several outstanding features, including totally enclosed pressure-lubricated valve-operating mechanism, an anti-icing fuel injection system and automatic mixture and boost controls, and a special cowling arrangement, with pressure baffles and fan

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CIVIL AVIATION NEWS

ADDENDA: This latest view of the Armstrong Whitworth Apollo clearly shows the recently added dorsal fin which is part of newly embodied improvements. As mentioned on this page, the Apollo will make a European tour in September.

PERCIVAL PRINCE SERIES III

WITH production of the Prince Series I and II completed, Percival Aircraft, Ltd., has issued specifications for the Series III version of this versatile aircraft, now on the assembly line. The all-up weight of the new Prince has been increased to 11,000 lb and the calculated performance figures quoted here are based on the measured performance of a Prince II fitted with the more powerful Alvis Leonides 502/4 engines which are a feature of the Series III.

A disposable load of 2,642 lb allows seven passengers and a crew of two to be carried with full normal fuel load (173 gallons). This gives a still-air range at economical cruising speed (159 m.p.h. at 10,000ft) of 902 miles. If twelve passengers are carried the still-air range is decreased to 418 miles. Additional wing tanks may be fitted to give a maximum fuel capacity of 226 gallons.

At sea level the aircraft is capable of clearing a 50ft obstacle in 760 yards, this distance increasing to 950 yards when operating from airfields at an altitude of 5,000ft. Service ceiling at climbing power is 23,400ft, and rate of climb at this setting is 1,170 ft/min at rated altitude (7,900ft). Maximum level speed at sea level is 223 m.p.h. and with maximum weak mixture setting (at 5,000ft) the aircraft cruises comfortably at 178 m.p.h.

The one-engine-out figures are particularly good. At sea level in such circumstances the Prince III can clear a 50ft obstacle in 1,100 yards; the ceiling with one engine inoperative is 10,000ft. The aircraft thus meets fully the stringent I.C.A.O. requirements for machines of its type. An undisclosed number of Prince IIIs have been ordered by the Aeronorte company of Brazil, in addition to the single Series II aircraft with which the company has already been supplied. The manufacturers report that several operators in the United States have shown interest, and it is thought that there is a distinct possibility of orders from this area.

B.E.A. BEATS ITS BUDGET

THE latest estimate of the B.E.A. deficit for the financial year ending March 31st indicates that the figure will be even more favourable than was previously expected. Writing in the July issue of the *B.E.A. Magazine*, Lord Douglas of Kirtleside, the Corporation's chairman, says that although he had previously forecast a deficit in the region of £1,450,000, the actual figure works out at £1,363,594.

This result is thought by Mr. Peter Masefield, B.E.A.'s chief executive, to be particularly encouraging in view of the increased costs brought about by devaluation during the past year. The combined figures for April and May, 1950, showed increases of 28 and 32 per cent respectively, as compared with the revenue for the corresponding months of last year. Mr. Masefield points out, however, that although revenue had increased by £330,000, expenditure had also increased by £250,000, due to the extra cost of 28 per cent more flying, the extra fuel tax, and devaluation. The net result for these two months was, therefore, a deficit of £137,000 as compared with £232,000 last year.

B.E.A.'s most profitable route is said to be that from London to Istanbul and Malta, *via* Nice, Rome and Athens; during May it earned £154,000, with a load factor of 61 per cent. The highest load factor recorded, 69 per cent, was on the London-Belfast route, while the lowest load factor, 38 per cent, was that on the German and Scandinavian freight services.

Mr. Masefield refers also to economies which are to be effected by modifying the Corporation's DC-3s. A saving of nearly £100,000 a year will result from conversion of the aircraft to two-man-crew operation. Cockpits and instrument panels will be standardized and sealing and soundproofing improved. A new type of passenger seat will be fitted, and the cabin generally will have a more attractive appearance. With full catering facilities provided there will be room for 28 passengers, and on shorter routes, where no refreshments are served, the DC-3 will seat up to 33 passengers. It is considered that the cost of conversion is likely to be recovered in the first year of operation, and as the aircraft will be used for another five or six years, the initial investment should be well worth while.

Although in some quarters, notably the United States, the DC-3 is considered to be approaching the end of its useful life, British operators generally do not hold to this view. The proposed I.C.A.O. requirements for this type of aircraft are thought in this country to be unnecessarily stringent. It is understood, however, that the subject of airworthiness requirements for the DC-3 is to be reviewed at the next Airworthiness Conference of I.C.A.O., which is to be in Paris in February.

LLANDOW DISASTER INQUEST

A VERDICT of accidental death was recorded at the resumed inquest on the victims of the Tudor V disaster which occurred at Llandow on March 12th. A.V-M. D. C. T. Bennett, managing director of Fairflight, Ltd., told the coroner that he was convinced that the cause of the accident was due to the pilot's seat having slipped on its rails during the final approach. The most recent investigation of the rails had shown, he said, that the seat was not locked at the time of impact, and there was evidence to show that two vertical plungers which fitted into slots in the rails were not bent, whereas in the second pilot's seat they had been damaged.

APOLLO ON TOUR

THE second British airliner powered by turboprops to be demonstrated to European airlines will be the Armstrong-Whitworth Apollo which, after the S.B.A.C. Display at Farnborough in September, is to undertake a tour planned to include Spain, Italy and Switzerland. Since its last public appearance the Apollo has undergone a number of modifica-

CIVIL AVIATION NEWS . . .

tions. These include the addition of a dorsal fin, an increase in the span of the tailplane, and dimensional increase of the tailplane-anchorage torsion-box. Increased flap area has been provided to compensate for the section of flap which previously extended beneath the fuselage. The Apollo has now completed more than 100 hours' test flying, and the grant of an experimental-category C. of A is expected shortly. A second prototype is now reported to be nearing completion at the Armstrong Whitworth factory.

Powered by Mamba Mk. 1 turboprops, the Apollo has a maximum take-off weight of 45,000 lb and a maximum disposable load of 16,050 lb. Cruising at 276 m.p.h. at 20,000ft, the aircraft has a range of 920 miles, with 7,500 lb payload.

NATIONAL AIRWAYS PLAN

FROM August 1st all transatlantic aircraft approaching London Airport will complete the last 250 miles of their flight under the operational control of Green Airway One, the first of the National Airways network to come into operation. The complete system (illustrated on this page) is being progressively introduced in three phases, of which the first has now been completed. The second will consist of the extension of Green Airway One from London eastwards to Brussels *via* Maidstone and North Foreland, and the institution of Amber One (Daventry-Dunsfold-Dieppe-Paris), Amber Two (Daventry-Maidstone-Abbeville-Paris), and Red One (Dunsfold-Maidstone-Amsterdam), with another section leading to the Channel Islands.

The extension of Amber One northwards to Prestwick and Glasgow and the opening of Green Two, Red Three and Blue Two will complete the third phase.

Each airway will be divided by radio fan markers placed at regular intervals along its length, and traffic within the lane will be so regulated that no two aircraft are in one section at the same height at the same time. Aircraft will follow holding procedures over the marker beacons until clearance has been given to enter the section ahead. Military aircraft having occasion to cross an airway will be controlled. The principles on which the control is based were described in *Flight* of July 13th.

SKY-LANES: Location of the V.H.F. fan markers are seen in relation to the major airports and M.F range stations which constitute the axes of the National Airways network described on this page. Aircraft approaching a control zone will do so *via* the air lanes, having obtained clearance before entering a particular section. The first lane opens on August 1st.

BREVITIES

IT has now been announced by the C.A.B. that President Truman has approved the sale of A.O.A. to Pan American World Airways for a sum of approximately £6½ million. As intimated in *Flight* last week, the merger is subject to a revision of the trans-Atlantic route-structure.

* * *

International traffic transactions made through the I.A.T.A. Clearing House, London, during May totalled some $14,002,000, bringing the volume of such clearances for the first five months of the year to $64,085,000.

* * *

For the first quarter of this year B.C.P.A. reports substantial improvements in traffic on routes between Australia, New Zealand and North America, as compared with figures for the corresponding period of 1949. Results for the quarter are expected to show a profit.

* * *

Although Central African Airways Corporation is now only in its fourth year of operation, development, particularly of passenger traffic, is said to have exceeded all expectations. Passenger mileage rose from 12,095,159 in 1947 to 19,981,538 in 1949. Cargo lifted in the whole of 1947 amounted to 79,543 kg; this year the figure was 120,550 kg for the first three months.

* * *

Of the passenger load factors achieved by the three main Australian airlines for 1949, the highest was that recorded by T.A.A. (65.1 per cent). The A.N.A. load factor was 63.8 per cent and that of Ansett Airways 46.7 per cent. The Ansett Airways load factor was related to DC-3s with a seating capacity of 28, as compared with the 21- and 24-seat versions operated by T.A.A. and A.N.A. respectively.

In 1949 Sabena made 12,686 commercial flights; of this total 2,650 were on the Belgian Congo network and 247 on North Atlantic routes.

* * *

On the B.O.A.C.-Qantas route between the United Kingdom and Australia, Constellation passenger services have now reached the record frequency of five per week in each direction.

* * *

The newly formed U.S. Air Coach Transport Association, mentioned in *Flight* of July 6th, has stated that last year 250,000 passengers used "air coach" services; this figure is expected to be doubled this year.

* * *

In *Flight* of June 15th it was stated that B.E.A. had ordered one Bristol 171 helicopter for operational trials. It now transpires that the helicopter is, in fact, merely on loan to the Corporation for tests which are being carried out by the B.E.A. Helicopter Experimental Unit.

* * *

Acting as principal contractor to the U.S. Air Force, Pan American World Airways is now assembling a fleet of some 27 aircraft which will take part in a special military air lift to the Far East. The aircraft, which are being provided by a total of nine airlines, include three Boeing 377s and 24 Douglas C-54s.

* * *

Total revenues of the principal Canadian carriers during 1949 reached the record figure of almost 39¼ million dollars. This represents an 18.4 per cent increase over the total for 1948. Operating expenses rose, however, by 17.1 per cent, and resulting net revenues showed only a slight improvement over the figure for the previous year.

INTERNATIONAL GLIDING CONTESTS

Some Reasons for Britain's Poor Showing

By ANN DOUGLAS
(Captain of the British Team)

THE 1950 International Gliding Competitions are over, and these notes are written as we return from Sweden with the sad reflection that the British team came near the bottom—15th, 24th, 25th and 27th, out of 29 competitors. Naturally this is a great disappointment to us, and we can profit only by attempting to study carefully why we ended where we did.

The standard of soaring in international competitions is now tremendously high. For instance, one pilot took only 30 min. longer than a power aircraft to cover 86 miles, the glider's average speed being nearly 53 m.p.h.; several other pilots took only a few minutes longer.

The Yugoslavian pilot, Arbaijter, finally placed fourth, flew 198 miles to the south on the penultimate contest day and arrived back at the airfield on the last day, having driven all night. Within 15 minutes he was launched again and flew 233 miles to the north, much of it over impenetrable forest country.

In England it is not appreciated how high the world standard has become, nor how low is the general British standard. If we regard the ability of our team pilots, drawn from the top rank of British soaring, as only 60 per cent of the world standard, we can begin to get some idea of the capabilities of the average British soaring pilot. This may sound rather hard, as in England gliding is regarded purely as a sport—perhaps if we changed the word to "relaxation" it would be nearer the mark. Often, we allow the work devoted to getting into the air to take precedence over any real work done once there. This is an unfortunate attitude, as not only does it prevent many of the poorer soaring days being used, but it produces complacence and lack of interest in the development of technique.

As regards technique, at Örebro we were thoroughly beaten by gliders with a lower performance than Olympias. It was an education to study the leaders, through binoculars, at the start of their flights. Speed and rate of circling were varied continuously to take advantage of every alteration of lift and sink. The glider was used purely as a tool and the maximum taken from it at all times. McCready (U.S.A.), especially, has developed his technique to a very high order indeed. Unless absolutely desperate, he ignores all but the strongest thermals, and when at his operational height he does not waste a second in reaching his straight-flight cruising speed, which is as high as conditions will permit.

As record distances have increased speed has become of prime importance, in order to get the most from the hours in which thermal activity exists. In England, generally, little thought is given to this aspect, largely because of the restrictions on distance-flying inherent in a small island. It was noticeable that it was in the speed dashes that our pilots showed up worst; we got there, but usually about 20 km/hr slower than most of the others.

The one thing in which our pilots did well was to land safely in the most appalling claptraps. Rough fields 100 metres long by about 20 metres wide, with obstructions, had to be regarded as reasonable. Up north the country is almost entirely covered with forest, interspersed with lakes, bogs, and with only a possible landing patch every 20 km or so. Macready landed in a bog on the last day, and the Finns, in their own country, sometimes land down-wind across the lakes, aiming just to reach the ice shore—usually sedge—before they lose way!

A further point on technique, which has been much more highly developed elsewhere, especially in Sweden and Switzerland, is an accurate knowledge of how far the glider will go from any given point at any given time. In England this experience is not so necessary, as we have fields everywhere, but in places like Sweden it may make the difference between a long flight or one shortened by a premature landing made because of doubt about reaching a safe landing area.

One last point on this subject. It was noticeable that the leading pilots had a very wide knowledge of met. and aerodynamics. It was not in the handling of their gliders that our pilots fell short, but in the technique of using them to the best advantage.

Now for some excuses for our deplorable position. Gliding in England is unsubsidized. This means that costs are high and facilities limited, which in turn means that it is extremely difficult for even the most up-and-coming pilots to get very far until they have been flying several years, by which time they have probably got married. Three of our pilots are over thirty, one of them over forty. The first and second places were taken by people in their twenties.

Lack of Training

Secondly, due to the ordinary demands of work, there was little time or opportunity for our team members to do any serious training—I mean training against "sparring partners," and not just practice flying. The winner of the contests was trained for contest flying by Capt. Alm of the Royal Swedish Air Force.

We could have pushed up our marks if we had been able to practice for a week in Sweden beforehand. But it was not possible to get there earlier, partly because the crews could not get away from their normal work for so long, partly because, as the team had to pay most of its expenses, the extra cost would have been prohibitive for some members. I am sure that in any strange country where conditions are at all different it is essential to have at least a week's practice.

One can go on thinking-up new excuses endlessly. Perhaps if we had had some height days, our pilots' experience in blind flying would have shown to advantage; if we had had retrieving cars with proper beds in them, as most of the others did, it might have helped. But one thing is certain: our position in these contests is the long-term result of the attitude toward gliding in England. Our best pilots are far enough ahead of the home average to *appear* really good, and so there is no incentive to improve technique; and, worse still, because there are so few of them, there is virtually no competition to help push up the standard.

We cannot go on decorating the bottom end of world championship results. We must either withdraw and have our domestic gliding for fun, or we must get down to some hard work.

We must get rid of our vague, down-wind, cross-country ideas and realize that, although a line to Puddlecombe looks very pretty on the club map, its value compared with some short out-and-return flights, in which the pilot slowly pushes his average speed, is negligible. If we can adopt this new attitude, the cost of retrieving will go down, the utilization of gliders will go up, and perhaps then we will not be ashamed to enter the 1952 World Championships.

The winner in his Weihe : B. Nilsson of the Swedish team.

FINAL PLACINGS

Pos.	Pilot	Sailplane	Nationality	Points
1	B. Nilsson	Weihe	Sweden	867.5
2	P. B. McCready	Weihe	U.S.A.	847.8
3	M. Borisek	Orao II	Yugoslavia	777.5
4	M. Arbaijter	Weihe	Yugoslavia	755.0
5	S. A. Magnusson	Weihe	Sweden	744.5
6	P. A. Persson	Weihe	Sweden	729.8
*7	T. Löf	Weihe	Sweden	714.3
*8	A. Gehriger	Weihe	Switzerland	712.9
9	R. Fontcilles	Arsenal 41 II	France	704.7
10	M. Lambert	Air 100	France	660.4
11	K. J. Tammer	Weihe	Finland	655.3
12	R. Comte	Schweizer SGS-23	U.S.A.	647.1
13	S. E. Alm	Weihe	Sweden	640.6
14	K. J. Halcius	Weihe	Finland	637.3
15	R. C. Forbes	Weihe	Gt. Britain	630.4
16	H. W. Jenson	Hütter 28	Denmark	622.5
17	P. C. Malcaux	Fokker Olympia	Holland	605.7
18	K. Rasmussen	Fi-1	Denmark	598.3
19	S. Maurer	Mosway VI	Switzerland	595.1
20	K. Ruckstuhl	Mosway III	Switzerland	585.9
21	H. R. Lasch	Air 100	South Africa	570.5
22	Fr. G. Lagler	Mosway III	Switzerland	568.3
23	M. Schachenmann	Air 100	Switzerland	554.4
24	L. Welch	Weihe	Gt. Britain	533.6
25	P. G. Mullett	Gull IV	Gt. Britain	519.1
26	A. G. Kleyn	Fokker Olympia	Holland	484.2
27	P. A. Wills	Weihe	Gt. Britain	482.2
28	P. Lepanse	Breguet 900	France	466.5
29	C. J. Haydn	Olympia	Norway	234.3

* These two competitors may change places on final confirmation of Löf's distance figure.

THE LAST THREE DAYS

AS stated last week (writes a correspondent), the fourth competition day was July 9th, with a speed race to Norrkoping (95.5 km). Stability in the lower levels retarded thermal activity until the afternoon, and the British team got away soon after 1 p.m.

(*Concluded at foot of next page*)

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Battle Honours

AS we waited on the wooden stands for the beginning of the King's Birthday Parade in Berlin a few weeks ago, perhaps most of us gave a thought to that Air Lift victory without which we would not have been there; nor would the Berliners so tranquilly have been strolling to watch our British ceremony. It was a victory in which the greatest credit must fall certainly to the Big Battalions of the Americans, but it was nevertheless one in which the Royal Air Force and British civilian airmen played no ignoble part.

To-day it is somewhat the fashion in Britain to decry the greatness of our past and to try to destroy the traditions that were built up while a little island was becoming the greatest power in the world; but there can have been few British hearts which did not beat quicker as the pipes swung across the parade ground in Berlin, followed by the massed bands of the English regiments.

The fine old tunes they played were full of the martial ardour of other days, redolent of an England whose sons gladly sought glory abroad and who paraded to honour their King on a hundred parade grounds in dust or sand or swamp or snow or jungle, in barren islands or in hostile towns, wherever the mysterious dictates of policy or interest decreed that Britain's writ should run and the "Pax Britannica" should reign.

The traditional ceremony went forward smoothly and correctly in the blazing sun of June in Berlin. The fine bearing and measured gait of the Scottish brigadier and the dignity and strength of the one-armed general were as British as the flags which encircled the parade ground. When a little breeze sprung up to display the Royal Standard as it was broken at the masthead, symbolizing the arrival of His Majesty the King, one felt that the very elements were on the side of the island which had produced such men and such tradition.

As the troops marched past, four of the great fighting regiments of the Army proudly bore their Colours in the centre of their array. As each Colour passed, the onlookers stood at the salute to honour the spirit and the history that have descended without a break from the fields of Blenheim and Ramillies through a hundred honourable campaigns to our own days of Paschendaele and the Rhine, El Alamein and the Burma jungle.

Last of all, in the city which in a single decade they had so greatly helped to destroy, and then to save, marched the Royal Air Force. But the little detachment received no tribute or salute, for they could carry no symbol to remind us of their short but glorious history. In the official programme they were bracketed with "the other Corps and Regiments who have *served* everywhere where the infantry have *fought*." (The italics are mine.)

The distaste of senior officers of the Royal Air Force for traditions has become almost a tradition in itself, but surely it is time now that the honours of the Battles of Britain and Berlin, of the Ruhr and the Western Desert, of the convoys and of Malta were enshrined in some manner worthy of the deeds that were done, so that the modern airman could feel himself the heir to the traditions of Ball and McCudden and Gibson and Cheshire and march as proudly as the Black Watch private who follows the Colour which bears the names of Waterloo, the Crimea and the Mutiny. B.A.O.R.

Hamburg.

Garland for Gatwick

ONE still hears complaints about the treatment received at some of the home and Continental airfields, particularly at the hands of the Customs people, so I am pleased to be able to hand out a well-deserved bouquet, knowing that many others will agree.

Everyone at Gatwick has always been most helpful to me, and on any future occasion when I have cause to cross the beaches, I shall clear in and out from Gatwick, the airfield at which I have always enjoyed friendly service, the greatest courtesy, and—just as important to the busy man—unusual expeditiousness by each department of H.M. Customs, by flying control, and by the airfield porters. A. JENKINS.

Ashtead, Surrey.

Italy's First Jet

ON page 70 of your July 13th issue you print a paragraph about "Italy's First Jet," the G.80. I do not believe, however, that this is correct, as I have before me a little Penguin book, *British Aircraft 1944, Part II*. In this there is an article, complete with photographs, about a Caproni-Campini jet. It is claimed that it first flew on August 27th, 1940, and reached a speed of 441 m.p.h. A further flight is reported in November, 1941, between Milan and Rome, at an average speed of 130 m.p.h., including a 2½-hour stop at Pisa.

London, N.14. G. PICKWORTH.

[Our correspondent is correct, and details of the Caproni-Campini design are, in fact, recorded and illustrated in *Gas Turbines and Jet Propulsion*, by G. Geoffrey Smith. We should, however, doubt the claim to 441 m.p.h.; the maximum speed of this machine was generally accepted to be 205 m.p.h. at 9,800ft, or about 230 m.p.h. with afterburning.—ED.]

GLIDING CONTESTS (*Cont. from previous page*)

By this time Mallett had received a replacement cockpit cover from Slingsby's and he was able to take off with the rest of the team. The day's contest was won by McCready (U.S.A.) with a speed of 83 km/hr, Nilsson (Sweden) came 2nd with 72 km/hr, Mallett 12th (58 km/hr), Welch 15th (55 km/hr) and Forbes 17th (54 km/hr) Wills was forced to land just short of the goal and gained no marks for speed.

At the close of the day McCready led with 557 points to date, Nilsson was second (549), Forbes 15th (448), Welch 22nd (359), Mallett 26th (315) and Wills 28th (252).

July 10th dawned overcast and misty, and a rest day was declared. Thereafter, conditions were unsuitable until the 14th, when the fifth competition day was declared, for height-and-distance. The weather was unstable, with surface wind N.N.E. and upper wind S.E. Forbes was first off, and set a westerly course. Maurer (Switzerland) and Alm (Sweden) did not contact and returned for fresh starts. The day was won by McCready with 326 km and a gain of height of 2520 m, which performance retained him his lead with total points of 692. Nilsson was fourth with 287 km and 2380 m, retaining second place to date with 667 points. Wills gained sixth place in the day's competition with 263 km and 2475 m gain of height, but despite 116 points gained in the day's flying, his position remained 28th with 367 points to date. Mallett gained 18th place (195 km, 2000 m), Welch 20th (155 km, 2120 m) and Forbes 23rd (118 km, 2040 m), giving them 26th, 25th and 16th places respectively.

The sixth and last competition day was July 16th, with light S.E. winds and poor weather to the south. The contest was of goal flights. 16 pilots landed at Orsa (216 km), including all the British team. McCready made over 300 km, but was dropped to 2nd place by Nilsson's performance of 420 km. This flight made Nilsson the 1950 world champion. Full details of final placings are given on the previous page. M. E. P.

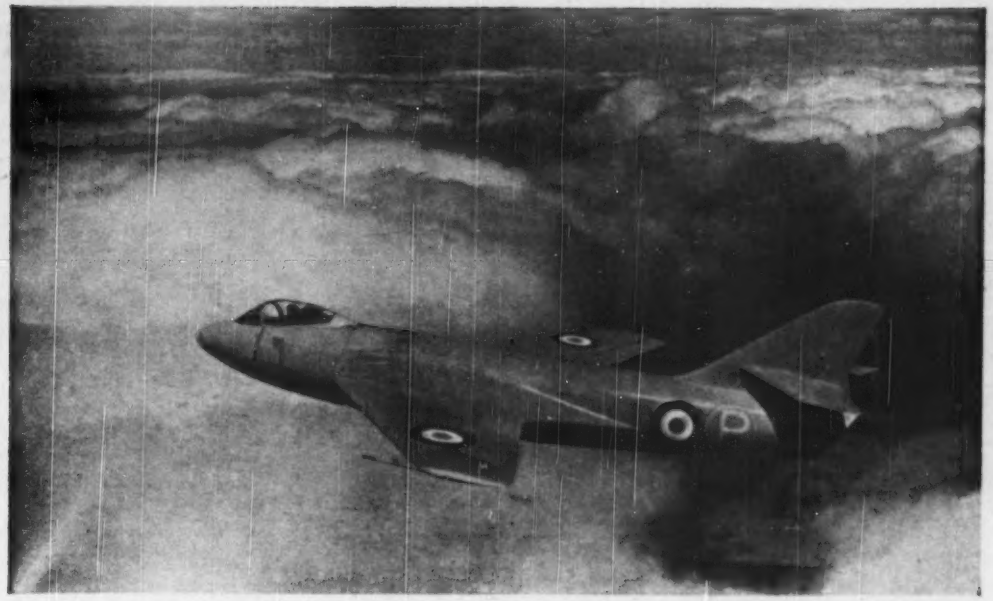
UNPREPAREDNESS (*Cont. from page 120*)

immediate measure, so that reserve air transport squadrons may be ready at short notice. There are some 150 large aircraft which could be utilized in this way.

From all that I have said it can be seen how much it is a question of money—money for better pay, money for more aircraft, and money for more equipment. Where is it to come from? When we are threatened with aggression it is madness not to prepare to defend ourselves. With an annual budget of over three thousand million pounds anyone who says that we cannot afford this or that for defence is really saying that he does not want to afford it; that he puts other things first. Admittedly, it is hard to give up things that we have only recently begun to enjoy, but if we were to succumb to an aggressor our democracy—and with it all our hopes for a better life for our people—would disappear.

In the years before the war, the Air League again and again called attention to the weakness of our air defences. The warning was heeded, but only after tragic and almost disastrous delays. In the Battle of France our men went into action against hopeless odds, and many of them in antiquated aircraft. The same applied to the pilots of the Fleet Air Arm in the war at sea. Such sacrifices must not be demanded again.

In this connection we feel bound to say that the grave concern which prompted the Council of the League to authorize me to make this public utterance has not been relieved by the replies given by the Minister of Defence in the House of Commons last Wednesday [July 12th] to questions on the state of our defences. He said that United Kingdom forces are being built up and equipped as rapidly as possible within the limits of our resources. That is not precise enough. The Minister was also asked whether this country is prepared to deal with any emergency that might arise anywhere in the foreseeable future. So far as our air defences are concerned the answer is not difficult. We are *not* prepared



COMPLETE CONFIDENCE in the handling qualities of his aircraft is shown by S/L. "Wimpey" Wade as he oins formation with the photographic Lancaster to permit this new *Flight* picture of the Hawker P.1081 to be taken. From this angle may be seen the fine fuselage shape of the new Nene-powered experimental fighter with its swept-back wing and tail surfaces. S/L. Wade has earned double congratulations—for escaping injury and for preserving the aircraft from serious damage—when (some minutes after this photograph was secured) the P.1081 made a forced landing at Odiham with one undercarriage leg retracted.

SERVICE AVIATION

Royal Air Force and Naval Aviation News and Announcements

New Conditions of Service

MR. ARTHUR HENDERSON, the Air Minister, recently mentioned the "new and improved" conditions of aircrew service, under which non-commissioned flying personnel will receive opportunities of signing a regular 22-year engagement on completion of their initial eight years' service. Although they will complete the final part of their service in a ground-trade, they will receive aircrew rates of pay throughout.

On Tuesday, Mr. Henderson was expected to make a full statement on a "new system of trade groups which enable an airman to make a life career in his group." We hope to deal with this new trade structure—affecting both aircrew and ground personnel—in the next issue of *Flight*.

Navy Day at Culdrose

FORMATION aerobatics by Sea Vampires of No. 702 Squadron, Naval Aviation, will be among the items on the display programme when R.N.A.S. Culdrose, Cornwall, is at home to the public on July 28th. Other events will include an army support demonstration by Sea Furies of the 52nd Training Group, and a fly-past by 32 different types of aircraft.

At least ten types, ranging from a Meteor to a Swordfish, will take part in a handicap race. The disparity in performances of the various competing aircraft should make this event both entertaining and original.

Sea Hornets of No. 809 Squadron and 802-Squadron Sea Vampires will defend the airfield against an "attack" by a carrier striking force. The comprehensive static exhibition will feature parked Naval aircraft, engines and armament, electrical and safety equipment.

Air Ministry Appointment

AIR COMMODORE G. S. SHAW, who was, until recently, Senior Air Liaison Officer with the United Kingdom Service Liaison Staff in South Africa, will succeed A.Cdre C. E. Chilton as Director of Personal Services at the Air Ministry from September 1st next. As already announced, A.Cdre. Chilton is one of the R.A.F. officers selected for the next course at the Imperial Defence College.

Before going to South Africa in July, 1948, A.Cdre. Shaw was A.O.C. at Air Headquarters, Burma, where he went early in 1947 after having been at the Air Ministry from November, 1943, first as Principal Deputy Director of Manning and afterwards as a Director of Manning. At the outbreak of the war he commanded the R.A.F. Station at Nairobi, East Africa, and afterwards served for nearly three years on organization duties at R.A.F. Middle East H.Q. until he went to Air Headquarters, East Africa, early in 1943, as Air Officer in Charge of Administration. Born in 1898, he joined the R.N.A.S. in 1917 and transferred to the Air Force the following year.

R.A.F. Swimming Championships

THE R.A.F. and W.R.A.F. individual and inter-command swimming championships will be held at R.A.F. Station, St. Athan, Glamorganshire, from August 29th to 31st. The inter-Services' swimming championships will take place at Eltham Baths, Kent, on September 21st.

R.O.C. Volunteers

IN June, 192 men and 48 women applied to join the Royal Observer Corps. The applications in each of the five R.O.C. areas were: Southern area, 36 men, 7 women; Midland area, 68 men, 24 women; Western area, 27 men, 9 women; North-Western area, 16 men, 3 women; Scottish area, 45 men, 5 women. The Air Ministry states that the R.O.C., like many other arms of the reserves, still needs more volunteers. The lower age limit is 16 and the upper age limits are 45 for service at centres, and 55 for service at posts.

R.N.V.R. Squadron in Malta

A SINGLE Firefly anti-submarine aircraft took off last Friday from the Royal Naval Air Station at Abbotsinch,

SERVICE AVIATION . . .

near Painley, for Malta, flying by way of Marseilles and Rome. It prepared the way for a similar flight by 15 Fireflies of No. 1830 (R.N.V.R.) Squadron, based at Abbotsinch, which, as a result of their outstanding training performance when embarked in H.M.S. *Illustrious* last year, will spend the 1950 training period on anti-submarine exercises with the Mediterranean Fleet.

The Squadron will take off from Abbotsinch on Sunday, July 30th, for Lee-on-Solent, where they will fly the following day to Marseilles. The last lap of the flight from Marseilles to Rome and then on to Malta will be undertaken on Tuesday, August 1st.

No. 1830 Squadron, recruited from the Glasgow and Edinburgh areas, is commanded by Lt.-Cdr. (A) J. D. Murricane, R.N.V.R., who won the D.S.C. for distinguished services in the Mediterranean theatre during the last war. Its aircrew strength is 15 pilots and seven observers.

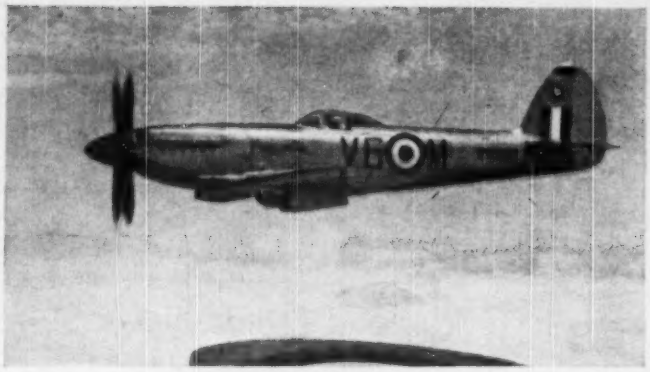
Last year, the Squadron received the Boyd Trophy, awarded annually for the finest feat of aviation of the year in the Royal Navy, for their remarkable achievement in completing 205 deck-landings with only one minor accident, while training in *Illustrious*. At Malta, the programme will consist of anti-submarine exercises, rocket-projectile firing and long navigational exercises over the sea.

The Squadron's non-flying R.N. and R.N.V.R. maintenance personnel will be transported to Malta, together with baggage and stores, by Dakota.

The Squadron's aircraft will leave Malta on August 10th and follow a route similar to that taken on the outward journey, arriving back at Abbotsinch on August 12th.

Service Gliding Teams

BOTH Naval Aviation and the R.A.F. are represented in the National Gliding Contests, which are now in progress at Great Hucklow, Derbyshire.



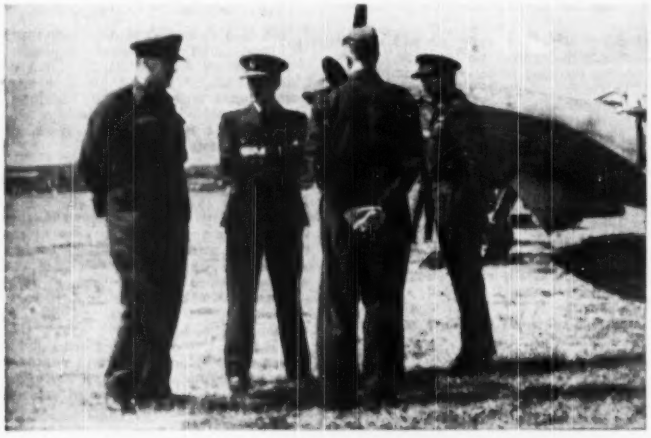
PERFECT PROFILE: Few will deny that the Spitfire remains one of the most beautiful aircraft ever produced. Pictorial proof of a widely held opinion is offered here by a Mk. 22, finished in the latest colours of No. 615 (County of Surrey) Squadron, Royal Auxiliary Air Force and flown by the C.O., S/L. Peter Devitt.

There are seven R.A.F. entries: an Eon Olympia from No. 188 Gliding School (Barrow); Rhönbussard—No. 148 G.S. (Hornchurch); Slingsby Sedbergh—No. 89 G.S. (Christchurch); Slingsby Prefect—No. 65 Group (Hendon); Grunau 2B—No. 64 Group (York); Slingsby Gull—No. 204 G.S. (Sydenham, N. Ireland); Slingsby Sedbergh—R.A.F. Gliding Instructors' School (Detling).

A.T.C. cadets will take part in the contests. In addition to flying as passengers in the two-seat gliders they will assist in rigging and retrieving the aircraft.

The Navy is entering a two-man team, consisting of Lt. Cdr. G. A. J. Goodhart, a torpedo officer, and his brother, Lt. Cdr. (E) H. C. N. Goodheart, a test pilot.

Both are members of the Portsmouth Naval Gliding Club, which is affiliated to the Royal Naval Gliding and Soaring Association, formed in 1947 to stimulate interest in gliding and soaring as a sport and recreation. It has a membership of about 80, including a number of Wrens. The Navy also has gliding clubs at Lossiemouth and Eglinton.



AUXILIARIES INSPECTED: During its summer camp at Tangmere, No. 615 Squadron was visited by Air Marshal Sir Basil Embry, the A.O.C.-in-C., Fighter Command. Shown here are (left to right): F/L. Shillingford, Auxiliary adjutant; Sir Basil Embry; F/L. Weir, engineering officer; F/L. Thoroughgood, D.F.C., Regular adjutant.

Far-East Flying-Boats

TWO Sunderlands from Hong Kong-based No. 88 Squadron, R.A.F. (an aircraft from which went to the relief of the *Amethyst* in the Yangtse last year), have completed a three-month detachment to the Fiji Islands, in the Pacific, where they served with a Royal New Zealand Air Force squadron. During the same period, two Catalinas flying boats from the R.N.Z.A.F. unit took part in the day-to-day activities of 88 Squadron in Hong Kong. This exchange was the first in a series designed to give R.A.F. and other Commonwealth Air Force aircrews experience in operating with each other.

Many of the alighting areas used by the R.A.F. Sunderlands during their flight to the Pacific were uncharted, and had never before been used by heavy flying boats. In addition to taking part in the normal training programme of the R.N.Z.A.F. Squadron the Sunderlands undertook a number of special missions. On one occasion, at the request of the Fiji Government, a Sunderland flew the High Commissioner of the Western Pacific and a number of officials on a ten-day annual inspection of the New Hebrides Condominium and the British Solomon Islands Protectorate. Later, the same aircraft flew to the Gilbert and Ellice Islands, in the Western Pacific, with six officials of the Western Pacific High Commission on board.

Air-sea rescue operations were a normal feature of the Sunderland's routine duties while at Fiji. Air searches for small sea-going craft swept off-course by hurricanes in the area were undertaken, and on each occasion proved successful. During a short stay in Auckland, the aircraft were inspected by 150 R.N.Z.A.F. cadets and trainees. Towards the end of their detachment, the Sunderland officers were invited to Wellington for discussions with the Director of Operations at the Air Department there, where maritime operational methods used by the R.A.F. were reviewed.

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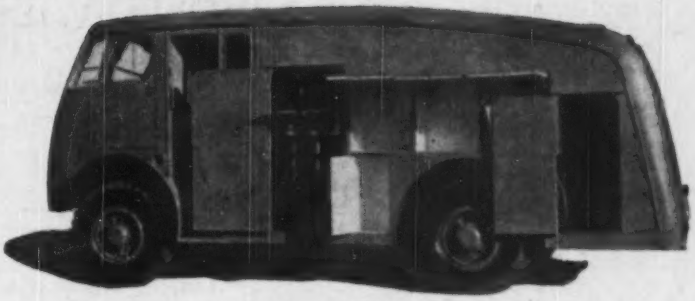

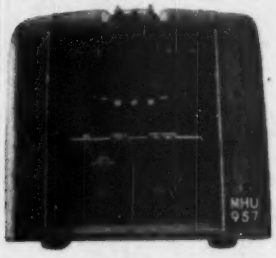

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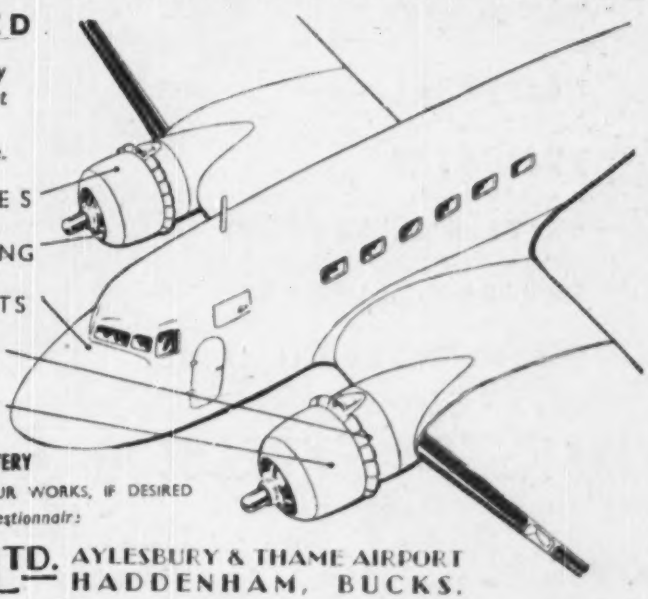

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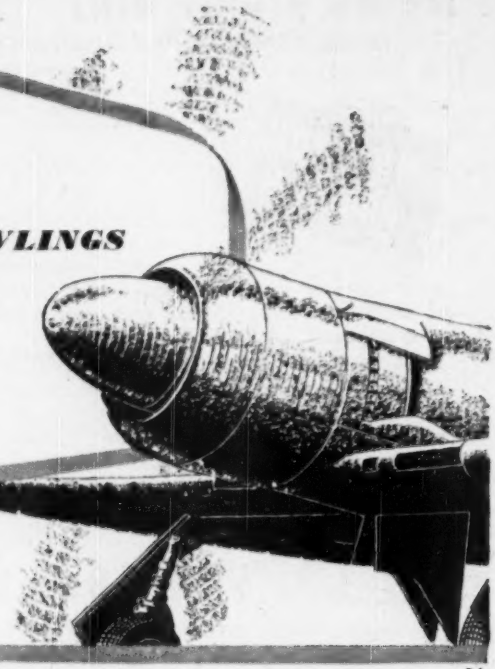

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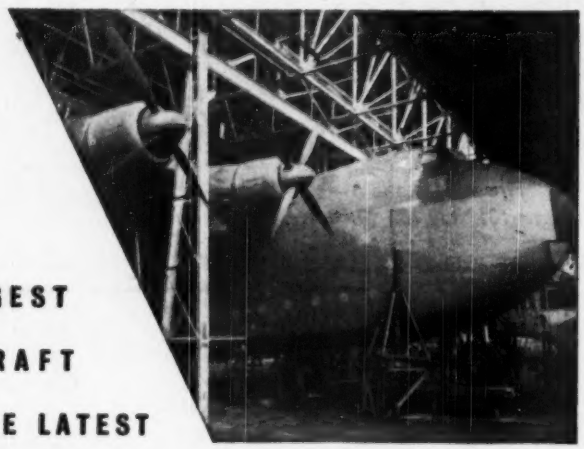

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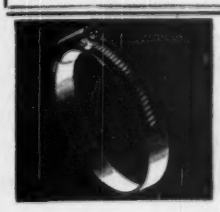

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N. P. LESTER, Town Clerk. Town Hall, Hastings. 17th July, 1950. [5225

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CLAWRENCE ALLEN, Town Clerk. Town Hall, Barrow-in-Furness. 14th July, 1950. [5210

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VACANCY in design office for weight control engineer; applicant must have experience in drawing office and preferably stress office.—Write stating age, previous employment, details of education, and salary required, to Personnel Manager, de Havilland Propellers, Ltd., Manor Rd., Hatfield, Herts. [5219

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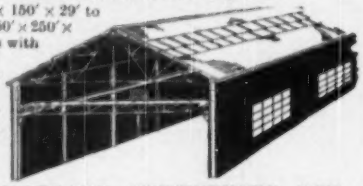

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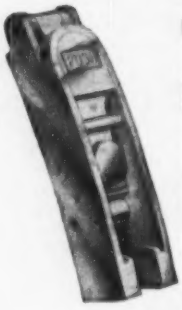

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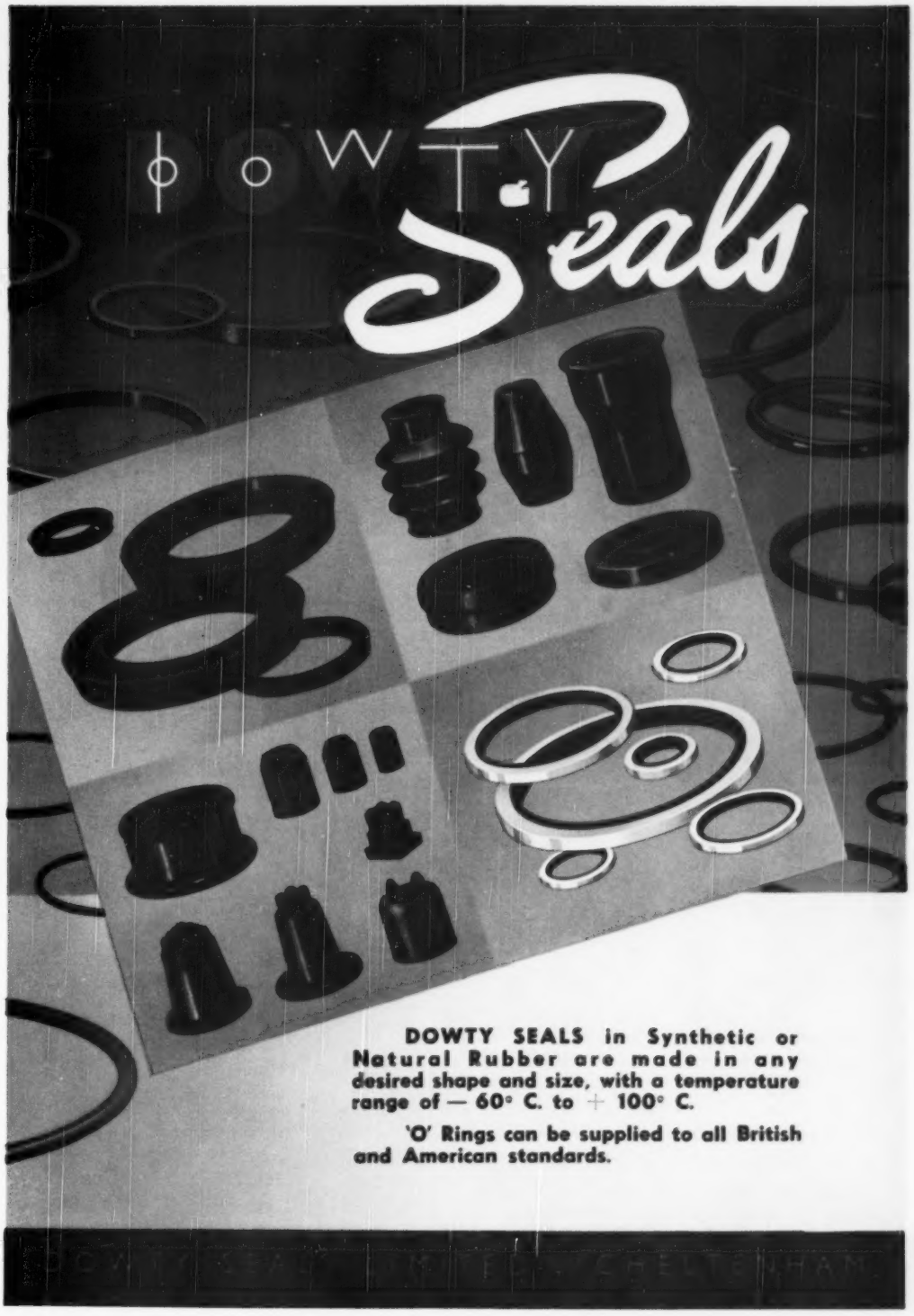

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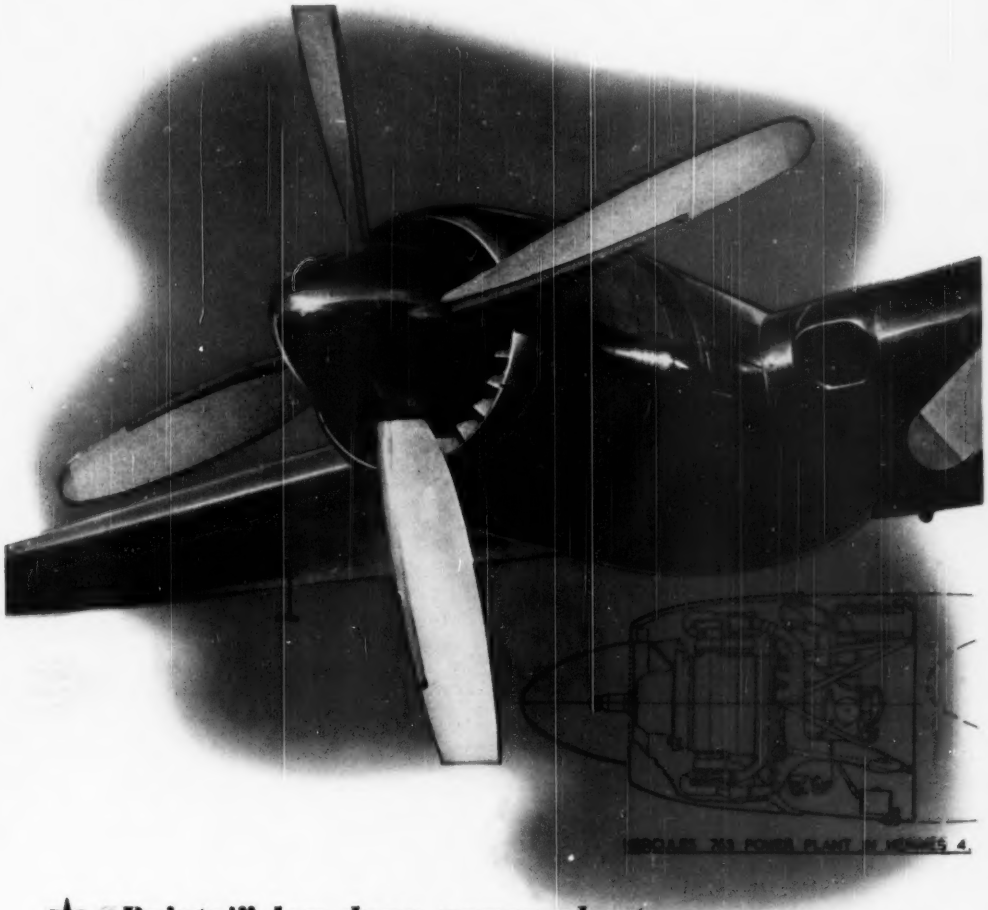

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